

50143/D



MARCVS MODIVS MEDICVS. *In Marmore*

Apud Illustrissimum Comitem Penbrokiæ, In Villa Carviliana.

Strakeley delin:

G. V. Dr. Guiche Sculp.

OF THE
S P L E E N,
I T S
D E S C R I P T I O N

A N D
H I S T O R Y,
U S E S and D I S E A S E S,

PARTICULARLY THE
V A P O R S, *with their* R E M E D Y.

Being a L E C T U R E *read at the* Royal College of
Physicians, London, 1722.

To which is Added

Some A N A T O M I C A L O B S E R V A T I O N S in the
D i s s e c t i o n of an E L E P H A N T.

By W I L L I A M S T U K E L E Y, M.D. CML. & SRS.

Nihil temere credendum, nihilque negligendum.

Hippoc. 6. Epidem. §. 2.

L O N D O N:

Printed for the A U T H O R. M D C C X X I I I.

Louis W. Ritchie, M.D. 1879
1723
156 years
George Town D.C.

Librum hunc cui titulus, *Of the Spleen, its Description and History, &c.* dignum censemus qui typis mandetur.

*Comitiis Censoriis in ædibus
Collegii 7. Feb. 172 $\frac{3}{4}$.*

Hans Sloan

Præses.

Henricus Plumptre

Jo. Arbuthnott

Jacobus Furin

Ca. Bale

Censores.





T O

Sir HANS SLOAN, Bar^t. M. D.

*President of the College of Physicians,
London, &c.*

S I R,



THE same reason that produces this lecture before the world, ascertains its particular address, because upon reading it in the Theatre, you and the fellows of this illustrious body, were pleas'd to express a desire that it should be printed. From thence I no longer look'd upon it as my own, but was ready to sacrifice every private consideration, rather than fail of the least duty and veneration, I owe so great a society; to which I had so lately the honor of being admitted, and by my faith given, promised to read within a year upon some anatomic subject. 'Tis no wonder I should consent to rest my own reputation upon the credit and judgment of the *British* college of physicians, whose sanction is sufficient to prepossess the favor of the most distant sons of *Hippocrates*; whose suffrage for true learning and
solid

D E D I C A T I O N.

solid philosophy of right claims the highest estimate, and whose method of practice (without the least vanity) may be said to exceed all that has gone before.

Nevertheless 'tis not my intent to surcharge the indulgence of so desirable a patronage. The world knows that a discourse pronounc'd, especially with some specious show of novelty, will pass it self with a tolerable grace upon an audience, but sink at a nearer glance, and when read from a typographical copy. Tho' I would not prognosticate so ill an *omen* upon my own pages, yet at present, perhaps, I know best their deficiency, and shall always take to my self the errors, and refer to you the glory of giving an opportunity of improving our art; if either by their refutation, or new occasional discoveries therefrom, it may receive the least advances.

I have likewise made use of this occasion to publish the account we drew up of the dissection of the elephant which you procur'd us, most justly therefore to be return'd to you again. I doubt not but your innate candor will favorably receive this, how mean soever, monument of my respect, and the friendship you have honor'd me with, and of my willingness to obey every command of the college.


November 7.

1723.

W^m STUKELEY.



TO THE
READER.

 *HIS discourse was wrote under the disadvantage of having only one preparing body, and read with no other solemnity than some preparations of spleens before us, and of the abdominal vessels injected with wax; because the executed bodies could not be procur'd according to usage. When I was induc'd to print it, I hop'd for many opportunities of re-examining my own opinions by the fountain of truth, in more frequent dissections, which is the reason of delaying its publication. But being defeated in those expectations, and some senior fellows of the College reminding me of my promise; oblig'd my compliance in the only command I should unwillingly obey. They suggested to me, that a lecture ought not to be look'd upon as a regular and finish'd work, and that if I thought fit, I might afterwards at my leisure improve it, and then it might properly be put into the learned language, and become a new book.*

I must add the same apology for the plates, which tho' drawn without the necessary assistances such works reasonably require, yet I believe they are in the general not so materially different from nature, but that they may be corrected without much deformity. This must be attributed to the great difficulties we lye under of getting a sufficient number of bodies, seeing the sanction of acts of parliament in our favor is so notoriously eluded by the insolence of the mob at our executions, well worthy the further regard of the legislature, from which only we can expect a remedy in what tends so much to the good of the commonwealth, and mankind in general. However I am convinc'd that the world has lost much improvement from the modesty of the learned, I will not say from its own severity in judgment. But they that are most conversant in human nature will know, that perfect treatises upon any subject, are not to be expected from any person. For my own part, it will ever be my temper to love and honor those that correct my errors for truths sake. And

To the Reader.

it will be obvious enough to an intelligent reader, that tho' I may have been too tedious in some particulars, yet several notions are started that I might, not impertinently, have much enlarged upon; and which I promise my self the pleasure of doing, when we are indulg'd with better opportunities for these sort of enquiries.

I am confident the reader will not be displeas'd at my prefixing a print of the famous Marcus Modius, Physician in the court of Augustus, from the fine busto in my Lord Pembroke's noble collection, to show my high esteem for the wisdom of the ancients. And the admirable poem on the spleen (which I obtain'd leave to insert) I judg'd necessary, to help out my own description of the disease.

The Elenchus of the spleen, by way of index, is design'd to give the reader a more compendious view or scheme of the lecture, and a more connected deduction of the method of reasoning loosely diffus'd thro' the whole.





A
P I N D A R I C O D E
O N T H E
S P L E E N,

By the Late RIGHT HONORABLE the

COUNTESS of *Winchelsea*.

W H A T art thou Spleen, which every thing do'st ape?
thou *Proteus* to abus'd mankind,
who never yet thy real cause could find,
or fix thee to remain in one continu'd shape!
still varying thy perplexing form,
now a dead sea thou'lt represent,
a calm of stupid discontent;
then dashing on the rocks, wilt rage into a storm.
trembling sometime thou do'st appear,
dissolv'd into a panic fear;
on sleep intruding do'st thy shadows spread,
thy gloomy terrors round the silent bed,
and croud with boding dreams the melancholy head.
or when the midnight hour is told,
and drooping lids thou still do'st waking hold,
thy fond delusions cheat the eyes;
before them antick spectres dance,
unusual fires their pointed heads advance,
and airy phantoms rise.
such was the monstrous vision seen,
when *Brutus* (now beneath his cares oppress'd
and all *Rome's* fortunes rolling in his breast)
before *Philippi's* latest field,
before his fate did to *Octavius* yield,
was vanquish'd by the Spleen.

Falsly the mortal part we blame
of our depress'd and pond'rous frame,

which

ODE on the S P L E E N.

which till the first degrading sin
let thee, its dull attendant, in;
still with the other did comply,
nor clog'd the active soul dispos'd to fly,
and range the mansions of its native sky.
nor whilst in his own heaven he dwelt,
whilst man his paradise posselt,
his fertile garden in the fragrant east,
and all united odors smelt;
no armed sweets, until thy reign,
could shock the sense, or in the face
a flush, unhandson color place.
now the junquil o'ercomes the feeble brain;
we faint beneath the aromatic pain,
till some offensive scent thy powers appease,
and pleasure we resign for short and nauseous ease.

In every one thou do'st possess,
new are thy motions and thy dress.
now in some grove a listning friend
thy false suggestions must attend,
thy whisper'd griefs, thy fancy'd sorrows hear,
breath'd in a sigh and witness'd by a tear.
whilst in the light and vulgar croud;
thy slaves more clamorous and loud,
by laughters unprovok'd, thy influence too confess.
in the imperious wife thou vapors art,
which from o'er-heated passions rise
in clouds, to the attractive brain,
until descending thence again,
thro' the o'ercast and showring eyes,
upon her husband's softned heart:
he the disputed point must yield.
something resign of the contested field.
till lordly man, born to imperial sway,
compounds for peace to make that right away,
and woman arm'd with spleen does servilely obey.

The fool to imitate the wits
complains of thy pretended fits,
and dullness born with him would lay
upon thy accidental sway;
because sometime thou do'st presume
into the ablest heads to come.

O D E *on the* S P L E E N.

that often men of thought refin'd,
impatient of unequal sense,
such slow returns, where they so much dispense:
retiring from the croud, are to thy shades inclin'd.
o'er me alas, thou do'st too much prevail,
I feel thy force, whilst I against thee rail,
I feel my verse decay, and my cramp numbers fail.

Thro' thy black jaundice I all objects see
as dark and terrible as thee.
my lines decry'd, and my employment thought
an useless folly or presumptuous fault.

whilst in the Muses paths I stray,
whilst in their groves and by their secret springs
my hand delights to trace unusual things,
and deviates from the known and common rules.

nor will in fading silks compose
faintly th' inimitable rose:
fill up an ill-drawn bird, or paint on glass
the sovereign's blurr'd and undistinguish'd face,
the threatening angel, and the speaking ass.

Patron thou art to every gross abuse,
the sullen husband's feign'd excuse,
when the ill humor with his wife he spends,
and bears recruited wit and spirits to his friends.

the son of *Bacchus* pleads thy power,
as to the glass he still repairs;
pretends but to remove thy cares,
snatch from thy shades one gay and smiling hour,
and drowns thy kingdom in a purple shower.

when the coquette, whom every fool admires,
would in variety be fair,

and changing hastily the scene
from light, impertinent and vain,
assumes a soft, a melancholy air:

and of her eyes rebates the wandring fires.

the careless posture and the head reclin'd,

the thoughtful and composed face,

proclaiming the withdrawn, the absent mind,

allows the fop more liberty to gaze,

who gently for the tender cause enquires.

the cause indeed is a defect in sense,

yet is the spleen alledg'd, and still the dull pretence.

ODE on the S P L E E N.

But these are thy fantastic harms,
the tricks of thy pernicious stage,
which do the weaker sort engage.
worse are the dire effects of thy more powerful charms.
by thee religion, all we know
that should enlighten here below,
is veil'd in darkness and perplex
with anxious doubts, with endless scruples vex,
and some restraint imply'd from each perverted text.
whilst touch not, taste not what is freely given,
is but thy niggard voice, disgracing bounteous heaven.
from speech restrain'd, by thy deceits abus'd,
to desarts banish'd or in cells reclus'd,
mistaken votaries to the powers divine
whilst they a purer sacrifice design,
do but the spleen obey, and worship at thy shrine.
in vain to chase thee every art we try,
in vain all remedies apply,
in vain the *indian* leaf infuse,
or the parch'd eastern berry bruise;
some pass in vain those bounds and nobler liquors use.
now harmony in vain we bring,
inspire the flute and touch the string.
from harmony no help is had,
music but soothes thee, if too sweetly sad,
and if too light but turns thee gayly mad.

Tho' the physician's greatest gains,
altho' his growing wealth he sees
daily increas'd by ladies fees,
yet do'st thou baffle all his studious pains.
not skilful *Lower* thy source could find,
or thro' the well-dissected body trace
the secret the mysterious ways,
by which thou do'st surprize and prey upon the mind.
tho' in the search, too deep for human thought,
with unsuccessful toil he wrought,
till thinking thee t'have catch'd, himself by thee was caught:
retain'd thy prisoner, thy acknowledg'd slave,
and sunk beneath thy chain to a lamented grave.

P R Æ.



PRÆLOQUIUM.



NON est dubitandum, auditores humanissimi, quin animalium mactatio ad deorum aras, anatomiae ortum dederit. Illius ergo antiquitas, mundo coeva, ad ritus istos sacros rectissime refertur: priusquam genus humanum fædo carniū esui assuesceret. Patet omninò, neminem quamvis mediocris ingenii, ab extis cæsorū consulendis abstinere potuisse. Quem non movet exquisitæ compagis, texturæ nobilissimæ ratio & usus? rara scilicet partium complicatio, inexplicabili curiositate efficta, situ, figura, colore, varietate oculos etiam stupidissimos perstringit. Necessarium est ut perfunctorie ad minimum perlustretur automaton hoc stupendum & admirabile: hic materiæ moventis mechanismus, elasticis facultatibus instructus & animatus, tam suæ vitæ conservandæ quam speciei propagandæ curam gerens.

Huc usque a sacrificiis itum est, Deos sanguine placantibus. Intimiora verò postea perscrutati sunt medicinæ patres & antistites. Non ideo contenti viscera affabrefacta quorum usus ignorabant, numinibus æque ignotis, sub igne & fumo consumere: sed acie anatomici innocuique cultri & mentis acumine, reconditissima quæque naturæ penetralia rimari satagebant, nec minus gratè Deo vero litantes. His summis viris, longa serie & jure hæreditario, antiquis temporibus, concredita hominū salus. Sparta sane illa longè nobilissima, & officium omni laude majus! Rectissime igitur secandis cadaveribus incubuere, ut œconomiae animalis leges, per animalium anatomiam patescerent: ut viventis vis & energia, ut morbi & sanitatis perversæ paradigmata, de mortuorum ostendantur scrutinio; ut dapis carneæ & luxus sulphurei nocumenta ejusdem generis sectionibus adjuventur.

Non est, auditores humanissimi & naturæ consulti, quod apologiam imaginariæ alicui barbariei, fictæve crudelitati prætendam, in hujusmodi exercitationibus. Præsertim in corona medicorum florentissima, a meticulosæ plebis stoliditate alienissima: quorum maxime interest, liberrimum philosophiæ & naturalis scientiæ campum aperire. Heic solum non profanum est sanguine manus contaminare, fibrasque humanas audacter inspicere & biolychnion in obscuritate quærere. Facinus mehercule divinum! quod ad summi opificis honorem, auctorisque machinæ adeo mirabilis gloriam redundet.

PRÆLOQUIUM.

dundet. Verùm fas est primariam ejusdem institutionem tam clare ob oculos ponere, ut jam quoque quædam immolatio, suprema majestate dignior censeatur: quod reverentiam debitam & modestiam in tali disquisitione excitet. Antiqui corpus humanum, metaphora aptissima, templi appellatione frequenter indigitabant: nec affirmare dubitemus nullibi magis conspicuam summi architecti præsentiam. In quo vera & genuina effulget visibilis gloria, judæorum nempe *schechina*, sicut olim super arcam in sancto sanctorum templi *Schelomonici*. Illuc semel tantum in anno intrabat pontifex, pompa solenni at non sine sanguine. Mundus universus est Dei immortalis templum, ait *Trismegistus*, at microcosmus ejusdem adytum sacratius & penetrabile. Ibidem immediate habitat & perpetuo operatur per divinam sui ipsius particulam, animam scilicet rationalem. Qua absente, nobis recessus venerandos intrare non est nefas.

Liceat ergo, mihi apollinei chori infimo, propylæum saltem salutare, excellentias vestras, viscus illud famigeratissimum, lienem scilicet explorandum provocare: & colore & usu obscurum, sed prorsus nemini, bilem, uti spero, moturum. Nec stomachum, vulgari sensu, excitet splen, hilaritatis sedes apud antiquos. Dispiciamus ergo paululum aliquando, quidnam ejus natura faciat aut feret.





A

L E C T U R E

O N T H E

S P L E E N,

*Read in the THEATRE of the College of Physicians,
London. March 14, 15, 16. 1722.
At the GULSTONIAN Lecture.*



THE Ancients having but a slender notion of the circulation of the blood, and none of the chyliferous ducts, suppos'd the mesenteric vessels, especially those of the *porta*, conducted the digested aliment from the guts to the liver: which was the organ of their second concoction or sanguification. As the impure part of the chyle was left behind in the intestines, so the two excrementitious juices of the new-made blood, bile and melancholy, or yellow and black choler, were separated therefrom, the one by the gall-bladder, the other by the spleen, towards purification. *Aretæus Diuturn.* l. 15. *Avicen. Canon.* 3. *Fen.* 15. *tr.* l. c. 2. This was done by an attractive quality peculiar in them for that purpose, by which they solv'd the business of secretion: not much unlike our present philosophy, where the variety of attractions and coalescences of the separated fluids in our glands, makes one of the chief requisites. *Erasistratus* and his successors thought the liver a *parenchyma* of good blood coagulated, as the spleen of bad, and that they both drew the congenial humor to themselves by similitude and sympathy. So that the gall-bladder and spleen were look'd upon in their esteem, as reservoirs of these feculencies of the blood, till they were either discharg'd the body, or alter'd for the better, and fit to be retain'd. The first having its excretory duct into the *duodenum*, there threw out its golden juice, not unuseful in the way, by its *stimulus* on the intestines promoting their peristaltic motion, and journey of the chyle thro' their whole length, as well as the discharge of the excrements: but the spleen having no such outlet, was provided with arteries and veins, by all remarked as extraordinary, and more than seem'd necessary to the proportion of the bulk of the

OPINION
of the AN-
CIENTS.

B

part,

part, even much larger than the *Epatics*. As the vein was to draw or convey this melancholy to the spleen, the artery by fresh streams of pure blood coming to it in so plentiful a manner, was by degrees to concoct and clarify it therein, till at length it was fit to be admitted into the mass again. If this could not be done, it produc'd the disease of the part, which to this day we call the S P L E E N, meaning a redundancy of that humor, and for its relief was oblig'd to discharge it, either into the guts by the mesenteric vessels, or by the hæmorrhoids, or by urine thro' the emulgents, or by the *vas breve*, thence by vomiting thro' the stomach. They having a perfect notion of the arterial strength of this part, by which it was able in contraction to force out its contained humour, as well as in a relaxed state to admit it; and likewise that there was a natural communication between the spleen and all these parts. This then being the shop, as it were, of so beneficial an operation, they had reason enough to make it the seat of laughter, of mirth, and pleasure. Here resided the luxury of *Venus*, of lascivious dreams, imaginations, and the golden age of Life. As the *atra bilis* created anger and melancholy, so the spleen which was to purge it off render'd us chearful and alert. Which opinions of theirs seem, if rightly understood, not far distant from the truth. Tho' some Splenetics may imagine it has no better a pretence to this merry quality, than as it administers divers occasions of laughter, at the strange uses from time to time, invention has attributed to this noble *viscus*: for other I cannot think it, from the peculiarity and extraordinary elegance of its structure, from the greatness and number of its blood-vessels and nerves, the multifarious connections and relationship it has to so many other principal parts, especially the whole contents of the *abdomen*. 'Tis plain, the lower belly is the kitchen (as we may aptly call it) of all the first and great actions of the animal family or œconomy, the storehouse and dispensary of the microcosm. In *Hipp.* the *promus condus, œconomus*. Not to mention that therein are the provisions for propagation of the *Species*: we see that the whole business of digestion and distribution of the nourishment is here perform'd. The uses of the *apparatus* for this principal end are by the industry of the Curious pretty manifest, except that of the Spleen; which yet has not fail'd to be a subject of enquiry in all ages, and has rack'd the brains of physicians, as well as the bowels of their patients. For altho' the conceptions of the ancients about it are not absurd, yet far are they from being very satisfactory, and perfectly conformable to the better *Idea* succeeding times have acquir'd of the structure and mechanism of a living creature. But still, what formerly was the seat of joy is become a topic of grief to the moderns, since our improvements have presented us with no other than a negative knowledge therein; and in the main, we are forc'd to own our ignorance of nature's intention in forming the curious organ of the spleen.

PRESENT
DESIGN.

SECT. II. Certainly if beauty be the first temptation to love, we cannot but have a particular affection for the spleen. The delicacy of its construction will at first sight create a strong desire to know what purpose thereby is aim'd at in life. But it seems no easy task to answer the great problem of its use, after all the most famous Anatomists have fail'd in the attempt, after what the sagacious *Malpighi* so ingenuously confesses, page 116. "What therefore, says he, is to be thought of this artificial bowel, I am perfectly ignorant." But as every one has a right to expatiate in the free field of philosophy, and the pleasing researches of nature's works repay one's

one's time and pains with sufficient knowledge, at least we hit upon other useful thoughts by the way, if we be not fortunate enough to gain the mark of our enquiry; so frequently truths have been discovered by very inaccurate observers, which have escaped others diligence and perspicacity. Or possibly from unwearied endeavors, or even extravagant imaginations, of a mind greedy of truth, a more happy hint may be promoted, in a future scrutiny of the same question. "For which reason, and because the greatness of our profession permits to every one a free way of thinking," as *Riolan* says, I shall not decline throwing in my mite, which may perhaps prove equally matter of mirth, and divert, but cannot offend any one, if not improve; since I shall avoid carping at others labours or solutions, supposing they proceeded from the same motive as my own; to promote, as well as I am able, natural knowledge, and the improvement of our art for the benefit of mankind, and to illustrate the glory of the all-wise Creator. Without the base endeavour of raising a name for one's self upon impeachment of another's, which usage may as justly be returned me again. Or as if there was no way of finding truth but with the torch of contradiction in the mist of wrangling and calumny. Therefore I esteem it supervacaneous, as well as it is ungrateful, to prefix a pompous introduction and specious show of reading, in rehearsal of all the opinions in writers upon this part, in order to indulge the vanity and ill-nature of pulling them in pieces. In the course of this lecture I shall only make use of the works of the learned to settle a true natural history of the part, and confirm my own sentiments, where I imagine they conduce to that purpose. If it happens in a simple enarration thereof, what the positive use of it should be appears, it matters not what it cannot be. If I have hit upon any thing as conformable to verity as novel, or but more approaching to verisimilitude; I sufficiently answer my proposed end. If otherwise, 'tis no dishonor to have fallen short with so many elders of the faculty, and 'tis look'd upon as the mark of a generous mind, to have attempted a difficult subject: and certainly what is more worthy of searching into? 'Tis vain to trouble this learned auditory with mere transcriptions, with what is trite and facil. We were hopeless to find it out, if we did not attempt it; and why may not the same benefit at least attend our curiosity, as has so often happen'd to the laborers in the philosopher's stone, the longitude, or perpetual motion? who, tho' disappointed in what they propos'd, yet have attain'd the honor of discovering by the way other very useful secrets. May not the Supreme Author be suppos'd to have thrown in these great *Postulata*, on purpose to actuate the ambition of the Ingenious in contemplation of his works? However as to the product of our disquisition on this matter in an hypothetic way, the masters of the Anatomic knife (of whom I have the pleasure to see many in this place) will be but just to themselves in vouchsafing it a consideration, and if it engages them by a new *examen* to show its falsity only, I still promote the cause of truth; since it is the beginning of knowledge to discover error, and some satisfaction to be further assur'd what it is not, if we gain nothing more of certainty in such an abstruse speculation. I must likewise acquaint you that I design to throw loosely together what I have wrote on this subject, and much as at first it came from the pen, rather by the way of *Socratical* quæries than dogmatical corollaries. A synthetical way of treating anatomical subjects I prefer with *Riolan*, *Anthopogr.* i. 21. and approved by the great *Morgagni adversar.*

far. anatom. ii. p. 10. The reasons I shall bring in proof of my assertions, will be promiscuously interspers'd, without any solemn strictness or mathematical connexion and demonstration, because such was the manner of the ancients, and I would rather persuade than force an assent. Not to say that I judge such a procedure fitter to entertain an audience, or that I am pretty much of *Baglivi's* opinion in those matters, *de fibr. motr.* i. 10. *coroll.* 2. I shall begin with a description of the part laid down as exactly as I can, from whence if haply the deductions be not genuine, a shorter way may be pay'd for a stronger *Genius*.

SPLEEN'S
SITUATION.

SECT. III. The spleen is a soft spongy *viscus* seated in the left *hypocondrium* or upper angle of the belly, under the diaphragm and stomach, between it, the left side of the *vertebræ*, the false ribs and *colon* in its descent to the *anus*, and the left kidney, in the posterior part of the body, within the ribs as it were, so that it cannot be felt externally unless swollen forwards either by nature or a disease, opposite to the liver; whence *Hippocrates* vi. *Epid.* calls it *ἡπαρ αἰσχροῦ* the left liver, as if a poize to the great weight of the true. By *Aretæus*, *Galen*, *Pollux*, and *Hesychius* call'd *ἡσπέρην*, *ἡσπέρης*, *ἡσπέρημον*, & *ἡσπέρηον*, in respect of the liver. *Hipp.* p. 54. & *Aristot.* Ed. Paris. 1619. T. 1. p. 776. 790. & *Græcus Anonymus*. Ed. 1616. c. 17. p. 20. 'Tis rarely situate on the right side, unless the order of the *viscera* be inverted, as in that case mention'd *Philos. transact.* numb. 107, p. 146. *Pliny* xi. 37. owns such prodigious. And *Aristotle histor. animal.* i. 17. where he adds that the like has sometime been found in brutes, and *gener. animal.* iv. 4. *Herophilus* the physician, famous for observing the rythm of pulses, once found it, says *Galen* vi. 8. *administr. anatom.* and likewise *Cornelius Gemma Frisius*. *Cosmocrit.* i. 6. and *Cyclognom.* i. 6. *Spigelius anatom.* viii. 5. says he has sometime found this anomalous position in coneys, in which it's most commonly fix'd to the bottom of the stomach by the *omentum*. Much the same in a dormouse. *Drelincourt* observ'd it once at *Paris*. *De lienosis* p. 3. and *Riolan. Opuscul. anatom.* p. 118. *Mentellus* in *epist. ad Pecquet.* p. 49. and *Cattierus obs.* 17. ap. *Borell.* p. 49. *Panarolus* in the year 1643, as appears from his *pente.* 5. *obs.* 7. and *Fr. ab Aquapendente*, *Skenkius* 3. *obs.* 9. *Drelincourt* the elder once in a *fætus* found it crouded thro' the diaphragm into the *thorax*. Nevertheless tho' in the most establish'd order of nature it's placed on the left side and on the left end of the stomach, in some few creatures it inclines more towards the *pylorus* and *duodenum*, as in the *lucia piscis*, land-tortoise, crocodile, pike, whence in the tortoise *Gassendus* not looking for it where it was, thought it had none, in *vita Peireskii*. In this creature it's much of the figure of a bean. The frog's is of the shape of a pea and bulk, placed in the very middle of the mesentery. In the skate it's placed between the middle lobe of the liver and the guts, it's broad, thick, and of a fleshy colour. In the magpy it's long, and placed between the stomach and liver. In the bat it's small and almost round, and posited in the lower and hinder region of the stomach, and is redder than the liver. In the partridge the broader part of the spleen lies upon the liver, of a livid colour and hangs upon the liver, and has blood-vessels to it, if *Sir George Ent* be not mistaken. The cel's is red, placed upon the left horn of the stomach which is divided into two. In the frog fish on the left side pretty low, and in a large fish of the figure and bulk of a human kidney.

SECT.

SECT. III. 1. 'Tis ty'd to the *peritonæum* as, it borrows its external coat CONNEXION. from it: to the back and *colon* by the inferior membrane of the *omentum*. Its concave side connects it to the upper fold of the *omentum*, and consequently to the *Pancreas*. *Marchetti* has seen the *Pancreas* substantially annex'd to it. Intermediate membranes and fibres suspend it between the diaphragm and left kidney, *Gal. Tom. i. p. 415.* and for the sake of it the left kidney in all animals is of a lower posture than the right if my judgment be of any value: And by blood-vessels and nerves it's nearly bound to them all, especially the stomach, *Hipp. p. 248. Jul. Pullux. p. 84.* which it most particularly regards in all creatures, however various in other respects. Nor do blood-vessels large and numerous alone, but likewise its upper part generally fastens it to the coats of the stomach on its left side, so that it's not easily separable. Moreover from the upper part of the spleen goes two at least blood-vessels, the venal and arterial *vas breve*, into the left side of the stomach. Sometime by its fissures and fibres it embraces the stomach as it were with fingers, as has been seen by *Riolan, Horstius, Highmor, Lindanus, &c.* Nevertheless nature to show her prerogative, and by way of contrast and contrariety, has affix'd it to the *porta* in the *salpa* and distant from the stomach, if *Blasius* his information be right. The hedgehog's being large is fastned very strongly to the stomach by means of a membrane. The pidgeon's is much of the bulk and shape of a wheat corn, and is placed a little above the stomach, rather upon the gullet. In the weazel it's of a liver colour, and affixed to the whole length of the stomach, and broad at bottom. In respect to adhesion this chief difference is observable between human and brutes, that in most respects in the latter 'tis not so carefully suspended, besides that it has not so many blood-vessels, and that it's never ty'd to the diaphragm. So that between the *vertebræ* and ribs it lies as behind a fortification. And in respect of other surrounding parts, in the whole it may be said to be the most securely guarded from external injuries, of any bowel in the lower belly, which I think another hint of its superior excellence and use whatever it be.

SECT. III. 2. There is usually but one, yet *Hippocrates* long since has observ'd that nature, in this respect too, sometimes deviates from her general practice. *Fallopian* has seen two or three of unequal bulk, plac'd atop of one another, *Obs. ad P. Mannam. p. 108.* Such I take that mentioned in *phil. transf. numb. 266. p. 690.* by Dr. *Musgrave*. *Aristotle* quotes such a case *de generat. animal. iv. 4.* *Posthins* saw it at *Montpelier, Panarol* at *Rome, Marchetti* at *Padua, anat. c. 4. Cæcil Foluis* at *Venice, Barthol. Epist. 62. Cent. i. and Boschus.* Mr. *Chefelden* tells us, he has twice in a human body seen three, twice two, and once four. *Cabrolus obs. 15.* saw two spleens with distinct vessels. *Morgagni* once in a man, twice in dogs observ'd many spleens, but never wanting: and instances of this sort are innumerable among anatomists. *Anatom. adversar. iii. p. 35. Cæl. Rhodigin.* instances it xxiv. 3. *Rondeletus in Skenkii l. iii. obs. 1. Cornel. Gemma Cosmocrit. i. 6. Bourdon anatom. c. 17. Harderus obs. 45. the German Ephemerides A. 1672. obs. 172. and 1686. obs. 61. Horstius obs. 8. Levin. Lemn. de occult. natur. mirac. iv. 7. Hofman. iv. de generat. hom. 10.* In the last body we dissected in this theatre I observ'd a little spleen bigger than a walnut, of the same substance, fill'd with the same kind of blood as the true, and connected to it by veins and arteries. However generally in the whole these taken together make up the bulk of the common and natural one. In the *Pho-*

cena or sea-calf there are four or five globular bodies, red, hardish, in substance like the spleen but of different bulks, the larger about the size of a bean or chefnut, so that they seem so many spleens. The spleen it self is compos'd, as it were, of many like globules clap'd together. *Aristotle hist. animal.* ii. 15. writes, "The spleen is generally in all creatures which have blood, but in many of those which are oviparous it's very small, as in most birds, particularly pidgeons, kites, hawks, owls. The *Capri-ceps* bird wants it intirely, say some. *Bournigius de Sangu.* 13. *R. Moræus de conf. valetud.* p. 693. *Entii apolog.* p. 60. The same is said of oviparous quadrupeds, as the tortoise, watermoufe, evit, lizard, crocodile, frog. But I suspect the truth thereof; or perhaps we may say with *Wotton de diff. animal. sed exiguis admodum lien veluti notæ gratia habetur.* *Pliny* takes notice of this, xi. 37. *Hist. Nat.* Vipers have scarce any, tho' an eel has a consierable one. It's said insects have none, contrary to the proverb *habet & musca splenem.* *Anonym. Græc.* 7. *Camærar. Cent.* vi. *obs.* 37. That the chameleon has none is affirmed by many, *Democritus, Aristotle, Pliny, Solinus, Gesner* and *Aldrovand. Panarolus*, and the royal academy at *Paris*. In human, it's very seldom wholly deficient, as *Laurentius* says in the dissection of a young man, who had no proper spleen, but the splenic vessels were very large, and terminated in a kind of glandular body, whence two large hæmorrhoidal veins. *Anat.* vi. *quæst.* 25. *Skenkius* observed the like in the famous *Matthias Ortelius* a citizen of *Antwerp*, *obs. med.* iii. but *Morgagni anatom. adversar.* iii. p. 36. questions whether he was not mistaken, and that it lay hid under that fleshy substance which he says cover'd the intestines. *Caspar Baubin* too mentions the same *In append. ad Rousetum de partu Cesareo.* *Valsalva* has observed it wanting, *Theatr. Tom.* ii. 391. *Arist. T.* i. p. 1124. *Hen. ab Here. obs.* p. 221. and *Hoberius* in a woman at *Paris*, *De morb. intern.* p. 584. l. 66. *ad calcem.* *Kerkringius obs.* xi. p. 31. which are all the instances I have met with, and suppose it to have been only wasted away and disappear'd, as happens sometimes in diseases, of which we shall have cases hereafter in proper place.

FIGURE.

SECT. III. 3. Its figure is exceeding various, beyond that of any other part of the body, which gives us a hint that it has no essential relation to its use. Sometime it's triangular, sometime square, round, globular, pointed, divided in the middle, or into lobules, &c. In *phil. transf.* numb. 58. p. 1188. there is an extraordinary spleen, large, and of the figure of a saw. *Higbmor* and *Horstius Junius* have noted it divided into lobes, the former gives us a cutt of a monstrous one. *Rhodus* has seen one round, *Bartholin* divided into five lobes like the kidneys of calves. Its bulk both natural and diseas'd is various, as *Aristotle* and *Galen* teach us. 'Tis generally about six fingers bredth long, three fingers bredth thick, and of the bredth of the hand: of the figure of a neat's tongue, or sole of the foot, thence call'd sometime *linguosum viscus.* *Hippocrates l. de anatom.* compares it with the human foot. *Ruff. Ephes.* Hence the plaisters of that form or pledgits are call'd *Splenia* by *Dioscorides, Pliny, Martial, Pollux* and *Hesychius. Festus. Andr. Lacuna in Epist. Gal.* first by *Hippocrates* as *Galen* witnesses. Likewise a piece of linnen ty'd upon the upper part of the head or forehead clothes, bears the same name, and are observed in antient *Greek* busts as marks of deification. The side next the ribs is convex, the other concave, where the vessels enter, and where it's join'd to the *omentum.* In the *Galeus piscis mas* says *Charlton Mantissa*

tissa anatomica, the spleen rises at the bottom and hinder part of the stomach, two fingers breadth at the beginning, for six fingers breadth long embracing the bottom of the stomach; after this it throws out a sort of *appendix* like the gut *cæcum*, then it becomes small and ends at the *pancreas*, being fifteen fingers breadth more in length: all this space it sends many and very large vessels to the stomach and intestins. 'Tis larger in a man than any other creature, in proportion to the bulk of his body, and in a woman rather larger than in a man. The most general distinction is, that the human is not so long for its bulk as in brutes. As to its form, the irregularities often seen in it are owing to the pressure of the circumjacent parts, which this spongy bowel adapts its self to, there spreading out its bulk where least resistance; and receives their impressions too, like wax seal'd, on any soft substance cast in a mold. This especially is not to be wonder'd at, when it becomes diseas'd; its sides not being able to resist the *impetus* of the circulating blood must swell out and relax, where its fibres are weakest, like Aneurisms. Instances of such we shall mention hereafter; nevertheless we observe 'tis always thick at the edges, not thin as the liver. It generally weighs with its contained blood, about fourteen ounces or a pound. When dry'd but a drachm. That of the goat before us weighs 3½s. The *Indian* pig's but two grains. The external face of the spleen is not smooth and level like the kidneys or liver, but full of little round risings or *tubera* like the skin of those that labor under the *elephantiasis*; which I conceive owing to the foregoing reason, the blood distending its little caverns, or at least to its own power of contraction, which stretches in some degree the outward surface or membrane, in the space between the insertion of its fibres therein. In outward circumstances it's most various in human kind; for in brutes no such remarkable difference is observable as to the same kind, only we may affirm it as an axiom, that the spleen of the latter is generally longer in shape, narrower, thinner and less withal, so that an ox's doubled shall not equal a man's. Still the variety of its shape in different creatures is surprizing, and nature seems to have made it in a merry mood. *Aristotle* iii. 13. *de part. animal.* teaches us in horned creatures 'tis most commonly round, in beasts with divided toes long, in whole-footed animals between both. That of the oxen is a foot and half long, its breadth almost equal throughout, *viz.* four inches where narrowest, five where broadest, scarce two in thickness. It's connected to the stomach for near the space of nine inches by very many strong fibres, in figure 'tis like the sole fish, unless thinner at its extremities. The spleen of the lamprey is a wonderful variation in nature: it's placed at the bottom of and behind the stomach upwards, two inches broad, lower it sharpens towards a point, but before it sends out leftwards a sort of *appendix* like the gut *cæcum* with a slender cavity in it, a third part of an inch broad and fifteen fingers breadth long; in the way it's ty'd here and there as with a fillet like the *colon*, and is of a darkish color. All this whole tract many and very large vessels from the stomach and guts across the mesentery enter the spleen. This and many more I had from Sir *Geo. Ent's apologia*. The *Indian* pig's is long, thin, of a florid color, adheres to the left side of the stomach. In the sprat it's very slender, long, and of a deep red. The barbel's is very florid, three inches long, firmly adheres to the ventricle and liver by many vessels. In the plaice it's si-
tuate just by the gall-bladder, about the middle of the liver, small, of a
black

black color, scarce so big as the nail of one's little finger, yet with a convexity on one side: There are very eminent vessels from it to the stomach and guts: The Haddock's is thin, long, livid, fastned to the gut, and sends a conspicuous branch into the bottom of the stomach. In the ape it's very small, long, of a scalene, triangular shape with impressions upon it, as it were the bite of teeth. It sticks to the left kidney but free from the *diaphragm*, say *Sylvius* and *Blasius*. An *Indian* monkey's was small, scarce three fingers breadth long, says the last mention'd author. In the elephant we dissected lately at the President's, it was of a half-moon figure: the same in a lyon and pheasant: pretty much the same in a horse. The coney's is thin, sharp at the ends, and represents the figure of an arm, says *Steno*. In a dog its upper part is narrow, contrary to the human, because we may rather say its head is revers'd, so solicitous has nature been in distinguishing between us and brutes in this material organ. A castor's is small, long and narrow. Wild *African* goat's oval: so is a frog's. Another wild goat's is squarish, as that before us. The hedghog's is large, oblong, slender and round. Triangular in the *torpedo* and sea-needle, where its substance is almost solid as to feeling like the liver. In the salamander it's long; round in hawks, ducks, eagles, crows, in the *ossifraga*. Round like a heart, or pyriform, as in a crocodile, tortoise, sword-fish, viper, pike. In the *Tursio* it's form'd as it were of many red parenchymous globules, from which short vessels go to the stomach, says *Bartholin*. In the sea-calf 'tis like a tongue. In some fishes, as the *squalus*, its outward surface rises in little round eminences, like clusters of grapes, and in lizards too. *Bartholin* says in the dolphin it seems to consist of many globules. The shape of the spleen in a horse is like a plow-share, its length a foot nine inches, its greatest breadth ten inches, its least one, from the broadest part to its point it decreases continually in breadth and thickness. A camel's is nine inches long, four broad, half an inch thick, says *Blasius*. In a civet-cat eight fingers breadth long, two broad.

COLOR.

SECT. III. 4. The color of the spleen is blewish, livid or like iron, and grows blacker with age. In a *fetus* 'tis red like the liver. In children new born is very fresh and florid, and becomes of a deeper dye in years, whence *Steph. de Mellis* calls it *luridus*, and rightly. The color in the human, as well as magnitude, is very various. It seems to darken in proportion to the heat of the animal. In oxen and swine 'tis whiter; in dogs and lyons generally more florid than the liver it self. In an alpine-mouse of a florid bloody color, so in the tiger, coney; in the frog red, the salamander's between black and red, blackish in the tortoise, of a bloody color in the viper, if of any. *Vesalius* takes notice the human is sometime like the color and protuberances of an *Elephantiasis*; and in some patients of that sort their whole skin has so nearly resembled it, that one would fancy they were compos'd entirely of spleens.

PARTS.

SECT. III. 5. The human spleen being generally of an oval figure, the upper part of it is call'd the head, and the inferior its tail, by *Ruffus Ephe-sius*, and *Hippocrates de Ossium nat.* § *L. Epidem.* The first by *Pollux*, is call'd *Σπλῆνις*. Along the middle of its concave side runs a white callous line call'd *Raphe*, whereto the *Omentum* is fasten'd, and upon this all the vessels enter into the bowel.

COATS.

SECT. III. 6. 'Tis invested with two tunics, the external deriv'd from the *peritoneum* or common lining of the *abdomen*, thicker than that of the liver, and thickning too with age. It's o'erspread with many fine vessels running

ning the length of it, and ty'd to the undermost by the extremities of the arteries. There are divers instances in Authors of this Coat becoming thick like leather. *Andernac. Columb. Baubin, Hoffman, Spigel. Riolan, Bartholin, Tulpus* and others have seen it. *Malpighi* found the inner coat cartilaginous in an ox. *Spigelius* mentions its being bony, *V. Mæbii fundament. physiol.* p. 376. The inner coat is compos'd of various rows of strong fibres crossing one another with different directions in a curious manner. 'Tis smooth, thick, hard, solid, tough, and sometime becomes bony, often tendinous or cartilaginous. 'Tis not made of an irregular woof of filaments, as other membranes generally are, but of small muscular fibres running to a point from one circumference, terminated by other like circles made of like threads or *radii* circumjacent: all which meeting with one another and firmly uniting, compose in the whole a muscular panicle. 'Tis finer and thinner than the external: and air blown into the artery of the part, will pass thro' it when the other is taken off. As the arteries arise from the body of the spleen, so the veins of the external coat are deriv'd from them, and by degrees conjoining into larger trunks, end in the entering vein, or go farther into those of the *omentum*. This membrane is fastned to that underneath it likewise, by many slender filaments seemingly propagated from the extremities of the fibrous pillars and net-work in the internal texture of the spleen. The spleen of the viper is said to have but one coat. The outward tegument of that in the frog-fish is very lax, and not adherent to the inner, so that if you cut but a large wound, the spleen will slip out of it.

SECT. III. 7. The vessels which run into the spleen are arteries, veins VESSELS and nerves, all very large and numerous, wrap'd together in one membrane or *capsula* form'd from the inner coat, and which pursues them into the substance of the spleen it self. The artery first exactly describ'd by *Arantius*, is the left branch of the *coeliac*, and largest, which running parallel to the horizon towards the left, under the stomach, and having sent many large branches to the stomach, *pancreas, omentum* both upper and under, *colon, rectum*, and sometimes to more parts, such as the mesentery, emulgents, kidneys, womb, bladder, and the like, becomes subdivided, first into two, then into four or more branches, and so enters and permeates, or rather composes the whole substance of the spleen: uniting all over its smaller twigs, with inexplicable variety running one into another, and forming an innumerable parcel of cells, between which they freely open into each other, as likewise into the wide expansions of the entering veins. Sometime the artery arises directly from the aorta, as *Jac. Silvius, Car. Stephanus, Fernelius*, I. 7. *Columbus* II. *Arantius Obs.* 35. *Septalius in Aristot. Prob. T.* 2. *Jessenius in Anat. Pragensi.* *Riolan* II. 23. and others have observ'd. The lienal vein is likewise very large, arising from (or rather running into) the left side of the *porta*. It accompanies the before-describ'd artery, and having communicated its branches to (or rather borrow'd from) as many circumjacent parts as we related of the artery, divides into two main branches. These subdivide again into several, and have *anastomoses* with some of the arteries lying near them, and then are conducted side by side with the arteries into the spleen along the *raphe*. There are no manner of valves, as several authors have fancy'd, unless somewhat like one in the vein, but not of any stricture, and for what purpose should there be such, seeing the *anastomoses* between the veins and

arteries elude their use. Indeed I suspect both valves and *anastomoses* are fictitious. The veins are continu'd in the spleen only as to their larger trunks, but not their minute ramifications; which would have weakned the bowel too much. The nerves of the spleen spring from the intercostal branch, and are strictly bound upon every most minute branching of the blood-vessels thro'out their whole progress. One branch particularly is bestow'd upon the outer membrane observ'd to be very nervous.

STRUC-
TURE.

SECT. III. 8. The substance of the spleen is different from any thing in the animal machine beside. It consists intirely of complications and inosculation of arteries, veins, nerves, and a muscular net-work of *fibrillæ*, which raise its whole body into cells of different figure and bulk, form'd between the vessels and fibrous extensions, reaching from one side of its inner coat to its opposite, or to the intermediate vessels, or to others running crossways, or sideways, with admirable curiosity connected together, and with the continuations of the arteries and veins; opening and communicating with each other all manner of ways: so that if you inject any liquor by the artery, it runs freely into the vein, & *vice versa*.

ARTERIES.

SECT. IV. This is a detail of its manner of substance and vessels; but because we design to give a more perfect history at least, of the spleen, and that all our future reasonings depend much upon the knowledge of its structure and communication with other *viscera* by means of its vessels and nerves: we shall enlarge upon the whole, from our own and the strictest observations of anatomists hitherto communicated. And first as order requires, we will begin with the arteries, of which we have made a draught Plate I. half as big as the life, chiefly from a curious preparation of the branchings of the *aorta* thro'out the *abdomen*, injected in wax by my friend and accurate anatomist Mr. *Joshua Symonds* Surgeon: where I have study'd to extricate it as much from confusion, as so perplex'd a scheme will permit; and taken the liberty to ascertain the names of the branches, which in Authors are a little intricate; to reconcile them to their varying denominations, and restore their most rational ones, with all the care and judgment I could pretend to.

TAB. I.

At the very descent of the great artery from the cavity of the *thorax* into the belly, in its passage thro' the *diaphragm*, go the two phrenic branches, mark'd in the scheme by the two letters B B, into the *diaphragm*, which divided into many sprigs are chiefly dispers'd upon its lower side towards the *vertebræ*, nevertheless send some sprigs to the upper part of the *diaphragm*, and even to the *pericardium* where it's continuous to the *diaphragm*. Below this, the great artery from its forepart projects a large and remarkable artery call'd the coeliac, mark'd G. Arising forwards for a little space, it becomes partite nearly at right angles into two branches of unequal bulk, at the upper limb of the inferior membrane of the *omentum* to which it's annex'd. The lesser branch goes directly to the right, the bigger to the left.

EPATIC. The one by a general name call'd the epatic, the other the splenic, from the *viscera* they chiefly tend to. The first or lesser advancing towards the right side, being seated upon the *pancreas*, sends a branch from its lower side mark'd H, to the lower membrane of the *omentum* on its right side, and to the ascending *colon*, which may properly be call'd *Epiplooo-colica posterior dextra*, and a branch I *Gastrica dextra posterior* from its upper side, with not many ramifications to the lower and back part of the stomach near the *pylorus* where it meets with the next: which goes from its upper side too, *viz.* the *pylorica* D. This encompasses the hinder part of the right side of

of the stomach and *pylorus*. Then this epatic main branch becomes divided into two; the uppermost tends to the lower and concave side of the liver, and enters with propriety by the general name of epatics AA into that huge *viscus*, nourishing its whole substance with the vital fluid; but first receives the umbilical artery *a* turn'd into a ligament, and throws off the two *Cysticæ* call'd *Gemellæ* or twins CC, encompassing the whole gall-bladder, and gives a solitary branch *b*, taken notice of in most authors, into the same hollow side of the liver. The other ramification of the two before spoken of, mark'd E, taking a compass and converging to the left side, makes the *Gastro-epiplois dextra* spreading its self along the bottom, fore and right part of the stomach upon the upper *limbus* of the anterior fold of the *omentum* with its ramifications on each hand, sent out *geniculatum*, or like the leaves of plants from their chief rib, reaching midway of the length of the stomach and embracing the right and lower half thereof, they may be call'd *Rami anteriores gastrici dextri*, mark'd *ee*. But at the same time, at the same joints it affords twigs mark'd *dd*, to the whole right side of the upper *lamina* of the cawl, the *Epiploicæ anteriores dextræ* represented depending and cut off in the scheme, that the subjected vessels may the better appear. We must likewise observe, that before this and near its origin it dispatches the *intestinalis* F to the *duodenum* which it covers with many branches, extending themselves even beyond the beginning of the *jejunum*. And as it's annex'd and upheld by the *pancreas* and upper membrane of the *omentum*, at the same time it imparts a twig to the *pancreas* mark'd *f*, and others to the *omentum*. Return we now to the first mentioned great coeliac, and trace its left great division call'd the splenic.

The splenic artery *g*, the other and larger and left division of the coeliac, SPLENIC. in its journey *sinistrorsum* towards the spleen, supported by the *pancreas* and lower *omentum*, from its upper part sends out a branch O, *gastrica posterior* to the backside of the stomach. Another from its underside K to the middle of the *pancreas*, and properly the *pancreatica*. Next from its upper side it parts with a very large and considerable branch, mark'd in the schemes by the letter P, the biggest of the whole stomach, call'd therefore *Gastrica major*. This creeps up perpendicular from the splenic behind the stomach, leaving two little twigs by the way *pp* on each hand upon the gibbosity thereof. When it's arrived to its upper part, with a full channel it diverges into two, nearly at right angles, one ramification marches along the ridge of the stomach towards the *pylorus*, bestowing at equal intervals or knots on both hands copious branches, which descending on the fore and backside of the ventricle in innumerable subdivisions inosculate with those coming from the bottom, as before describ'd, on the right side. Its other ramification on the top of the stomach going leftwards ascends still on the upper part of the stomach, dispersing in like manner from æquidistant knots on both sides, branches communicating with those coming from its inferior and left side, and likewise with the *vas breve* from the body of the neighbouring spleen. Thence it arrives at the *cardia* or superior orifice of the stomach, round which it twists it self and in a spiral line from right to left, whence very properly call'd *coronaria* q. All this while it perpetually spreads it self into smaller twigs upon the part, and dispenses one to the *œsophagus* it self, coming down from the midriff.

The splenic aforesaid next (and sometime before the last-mention'd) dispatches from its lower side a very large branch L, with numerous offspring

spring call'd properly *Epiploo-colica media* f. *major*, going to the middle of the under layer of the *omentum*. It presently divides with a right angle into two, one to the left, the other to the right, upon the length of the *colon* and *posterior* caul. The splenic artery next from its upper side sends a branch or two more to the stomach, on its back and left part, call'd *Gastricæ posteriores sinistræ* f. *minores*, mark'd QQ. Sometime one of these forms the *vas breve*. And now the splenic growing near the spleen takes upon it that name with propriety, and divides into two branches at the letter R, the superior and inferior. Sometime from the first goes off one of the last mention'd *Gastricæ sinistræ* or *vas breve*. From the inferior, or often above it, is detach'd one of great consideration N, which generally first sends out the *Epiploo-colica sinistra* M, to the lower *omentum* on its left side and *colon*. Then becomes the *Gastro-epiplois sinistra*, which goes to the under and left side of the ventricle, along the margin of the fore part of the *omentum*, meeting with the *Gastro-epiplois dextra* in the middle thereof. This from its upper side on both hands throws off double ramifications to the bottom of the stomach mark'd nn. From its under side, lets fall at the same time and at the same joints or spaces, long and narrow branches into the *anterior* membrane of the *omentum*, mark'd oo, represented cut off. The *superior* and *inferior* branches of the splenic artery now subdivide themselves into others, and are much contorted into many semicircles. From some of them there are one or more *anastomoses* with the veins lying next 'em coming from the spleen mark'd r, as several authors say. Generally from the inferior goes that mark'd T, the *hæmorrhoidalis splenicæ externa* to the outside of the descending *colon*. Then they all at once supported by the cawl enter the body of the spleen, in the strait line and knobby ridge call *Raphe*, in the concave side thereof thro' its whole length, together with the veins and nerves: composing the main part of the texture of the spleen. All authors take notice with surprize of the excessive magnitude and number of them, for immediately these arteries fill the whole body of the spleen with their branches. *Spigelius* and *Bartholin* say, they five times exceed the veins in number. Numerous and very large arteries, says *Glisson*, enter the spleen, much larger than the hepatic, tho' the liver is six times as big. *Helmont* says there are 400 branches of arteries in the spleen. *Drelincourt* calls 'em *Arteriarum myriada*, p. 12. *de lienosis*. *Zacut. Lusitan.* says, "it borrows its arteries from the great descending *Aorta*, more in number and larger than its bulk requires. This is the reason of that palpitation Hypochondriacs feel in their left side. Sometime, as we said before, from the superior branch of the splenic, but more regularly from the body of the spleen and its head or upper part, goes the celebrated *vas breve arteriosum* into the left side of the stomach. This is what the antients fancy'd to spew the melancholly juice out of the spleen into the stomach. And what the moderns suppose to furnish it with the acid liquor to cause appetite and promote digestion. However it certainly carries pure blood to that part as the rest of the arteries, whenever the spleen contracts it self. This is mark'd with the letter S in the schemes. It will swell towards the stomach upon a ligature, a plain indication that it communicates freely with all its blood-vessels. Whenever it arises without the body of the spleen from the splenic artery, it sends one branch into the stomach, another into the spleen. *Laurent. vi. Quæst. 26.* says, he never found the *breve vas* wanting. *Bartholin* has sometime seen it

it very much branch'd out. *Rolfinch* observ'd it spread into six ramifications, *Hornius* into four. In conies it's generally double, and in the dog quadruple or more. *Sylvius* has seen three eminent vessels going from the spleen to the emulgent vein. Sometime one is continu'd from the spleen to the internal hæmorrhoidals, but most commonly it communicates with both the mesenterics. There is another artery not to be neglected, mark'd V, arising from the body of the descending trunk of the *aorta*, and goes to the inside of the *rectum*, in order to make the internal hæmorrhoidal. This always has communication with the inferior mesenteric and colic ones, sometime it arises from the splenic it self, sometime from that I nam'd *Epiploo-colica media*, and sometime from the *Epiploo-colica sinistra*, or from others; but it's my business only to ascertain Nature's most common and genuine methods. This hæmorrhoidal when it's arriv'd to the back of the *rectum* throws its branches on both sides, and penetrates thro' its teguments to its inner membrane.

HÆMOR-
RHOIDAL.

The splenic arteries enter the spleen after a different manner in different animals, beside the little and no way material varieties in creatures of the same species. As the spleens of most larger animals are of a longer figure than the human, they are generally introduc'd simply, and without many subdivisions, into the broadest part or tail, whilst the head is firmly annex'd to the ventricle by membranes, and the *vas breve* of both sorts: but always in adults contorted and crooked, like the spermatics and hypogastrics spread upon the body of the womb. The rest of the arteries in the scheme, as being not so much to our purpose, such as the vertebals, lum-bals, emulgents, spermatics, iliacs, *sacra*, *mesenterica superior*, *inferior*, *media*, &c. to avoid being tedious, and because they are sufficiently known and understood by a bare inspection, and the explanation annexed thereto; we shall not enlarge upon any further. It's enough to observe in general the communication of all the abdominal arteries one with another, and with the spleen, both by proximity of their origins from the *aorta* and splenic, and frequent *anastomoses*, by way of the mesenterics, which I have not distributed so largely as in nature, that a drawing in *plano* might be less perplex'd.

Their EN-
TRANCE.

SECT. IV. The next thing we proceed upon, is to recapitulate the veins correspondent thereto, *viz.* the ramifications of the *porta* which is so remarkably distinguish'd from the *cava*, that it is as it were a system of it self, not generally emptying its fluid as all others, into the main channel of the great vein, but into the body of the liver, and therefore by the Ancients was call'd the hand of the liver, meaning thereby that it collected the chyle from the tract of the guts after digestion for the use of the liver, which was the organ of sanguification according to their opinion, and so was the chief instrument of supplying life and nourishment to all the parts. Which is one instance of the Ancients having a notion of a motion of the blood in the veins from the lesser branches into the greater trunks, being one half of the circulation. Were the abdominal veins deriv'd from the *cava*, as the arteries from the *aorta*, I might spare you and my self the time of particularly describing them, especially seeing the schemes are mark'd with the same letters upon each correspondent branch: But since Nature has for wise reasons deduc'd them from so different origins, and some veins have no arteries, or not exactly parallel, and *vice versa*; we cannot but conceive a great pleasure in observing, under these circumstances, by what

VEINS.

arts that curious mechanist has render'd the two systems compatible, and as it were indented counterparts. For which reason I have so contriv'd the scale of the schemes, that by laying one over another, and holding them up against the light, they appear in their natural order and situation, one in respect of the other, as in the human body. And because we cannot be too exact in a case of this importance, nor otherwise do justice to the part I have undertaken to patronize, but deviate too far from the method of other anatomists: I hold it highly necessary in the next place, to recite the history of the veins of the spleen, tho' as concise as may be.

TAB. II. From the concave side of the liver springs the great trunk of the *porta*, nearly as big as the *vena cava*, from many and large ramifications AAA, in the substance of that huge glandular *viscus*. After its free *anastomoses* with the *vena epatica* therein, it receives the umbilical *a*, now become a ligament, and then from its forepart the *cystica gemellæ* collected from many small hair-like filaments upon the body of the gall-bladder, mark'd C C. Then it receives a branch on each side B B the *phrenica dextra* and *sinistra*, from the diaphragm, and next into its forepart a little on the right side another little branch D from the posterior part of the *pylorus*, or inferior orifice of the stomach. Next it receives the tribute of the *Gastro-epiplois dextra* E into its right side from the lower and right half of the stomach and upper *omentum*. Sometime this is inserted above, sometime beneath the going off of the splenic. *Vesalius* says he has sometime observ'd it implanted into the splenic it self. 'Tis highly worthy of remark, that the *Gastro-epiploica*, both veins and arteries right and left, run in the margin of the upper limb of the *omentum* loose from the stomach, and ty'd to it only at the intervals of the branches it sends on both sides to it, suspended all the while by the *omentum*. This contrivance is admirable, because they run the length of the stomach; and otherwise would be in danger of breaking, nor could they possibly so well adapt themselves to the swelling and contracting of the stomach, or to its peristaltic action in digestion. The other gastric vessels which only run along its breadth more numerous and by shorter course, are by that means more free from such an apprehension, therefore more closely connected to its exterior membrane. The branches running from these conform themselves in all respects to those of the arteries above describ'd, and need not be repeated.

Next underneath this, and still from the right side of the *porta*, comes in a branch from the *duodenum* and beginning of the *jejunum*, call'd *intestinalis*, mark'd F, receiving little twigs from the *pancreas* f, near its duct into that first nam'd intestine. The next thing that offers it self to our consideration, is the splenic vein G, breaking from the left side of the *porta*, and almost equalling it in bulk. It runs in an horizontal line under the stomach, upon the under *lamina* of the *omentum*, and upon the *pancreas* along with the splenic artery directly to the spleen. But first near its origin from its under side, it sends a branch downwards H. into the right side of the lower duplicature of the *omentum* and *colon*, the *Epiploo-colica dextra*. Sometime this arises from the trunk it self of the *porta*: then another branch from its upper side, and sometime two, *venæ gastricae minores*, OI, not much subdivided, to the back and left side of the stomach; whereof I is sometime without a concomitant artery, because of the distant origins of the splenic vein and artery. Next from its lower side goes a twig or two to the *pancreas* K. After this, or perhaps after the next from its upper

upper part goes a large branch the *Gastrica major* P, because biggest of the stomach, supported by the inferior membrane of the *omentum*. It runs obliquely upward and leftward on the back of the stomach, dispersing two smaller twigs to the backside thereof pp, then going on divides into two greater branches at right angles, upon the top of the stomach, the right marching towards the *pylorus*, the left up to the *cardia* incircling it as is before describ'd in its cotrespondent artery: 'tis very beautiful to behold in dogs. The distribution of its *furculi* on all hands is like the artery too, and need not be recapitulated. On the left end of the stomach it communicates with the *vas breve* from the spleen.

Next, the splenic from its lower side dispatches a considerable branch L, *Epiploo-colica media*, in its descent dividing into two at right angles upon the *colon* and lower *omentum*, as they lye under the stomach. They have numerous branches, sometime an hæmorrhoidal is deriv'd from the left. Hence the splenic becomes branched out into two, superior and inferior R, and they into many more. From one of its upper divisions springs one or two more of the *Gastricæ minores sinistrae*, bringing the recurrent blood from the left and widest end of the stomach Q. Sometime too they give the *vas breve venosum*, which sends one twig to the stomach the other to the head of the spleen. From these upper divisions likewise are the *anastomoses* of the neighboring arteries r, so much talk'd of, but perhaps only imaginary. But from the inferior branch of the splenic shoots out in a bow from left to right the *Gastro-epiplois sinistra* N, which is the main channel of the blood on the left end of the stomach at its bottom. I need not be more particular upon it, because in all points correspondent to the artery which is synonymous. However near its origin goes off M, sometime without an artery, the *Epiploo-colica sinistra*. From some of those lower branches of the splenic generally is detach'd the *Ramus splenicæ hæmorrhoidalis externus* T, from the outside of the descending *colon*. Now the splenic ramifications are introduced in a row into the spleen, from whence on its upper part goes the *vas breve* to the stomach S, between its coats, rising upwards towards its orifice, and communicating freely with its veins and arteries. Sometime these vessels are doubled or trebled, and have a proportional excess of arteries. Sometime three, says *Saltzman, obs. anatom.* four, says *Drelincourt* from his father's observations. In the crocodile, where the spleen lies towards the right side, the *vas breve* goes to the bottom of the stomach, and so in several other creatures where the *viscus* observes that obliquity. The great branch of the *porta* which we left at the entrance of the splenic, soon from its left side receives the *hæmorrhoidalis portæ interna* V, from the descending *colon* and inside of the *rectum* in its back part. Twice or thrice *Veslingius*, once *Casseri* observ'd it to arise from the spleen it self; oftner 'tis deriv'd from the splenic. But most generally between the splenic and mesenteric divariations as here depicted. This internal hæmorrhoidal joins with the external from the *hypogastricæ* of the *cava* by several *anastomoses* about the *anus*. The mesenteric W, from many subdivisions call'd by one general name *Mesariacs*, collects the blood promiscuously from the guts, running every where upon the mesentery, and pours it with a copious stream into the liver.

SECT. V. We have conducted the splenic vein R into the body of the spleen, which it enters in many subdivisions along with the arteries and nerves. The arteries and veins, tho' they enter together marching side by side, and may for some space be separated from each other: yet upon the

VAS BREVE.

TEXTURE of
the SPLEEN.

very

TAB. III.

very point of their introduction, the sides of their coats are so closely united that they seem one, and can scarcely be parted. In this particularity I find, that the artery pierces intirely into the vein, like letting one Pipe into another, and folding up the oval aperture in the cylinder by which it enters, and this is done just upon the *Raphè*, so that the vein becomes a perfect *capsula* to the artery, as is most evidently seen in the ox's spleen before us, which I have caus'd to be exactly cut in Plate III. This is the *capsula* or *commune involucrum vasorum per medium Lienis perreptans* of *Malpighi*, really the vein. This capsular vein much exceeds in bulk the artery which runs along the middle of it, leaving a large vacuous space quite around. It's remarkable, that of its two coats or membranes which all veins have, just at its entrance it imparts its outermost to the inner membrane of the spleen, reserving only its innermost and thinnest, which it carries into the spleen. And here even in the body of the spleen the artery is still contorted, and proceeds till it comes to the extreme ends and sides of the spleen, sending out branches every way: first larger trunks, then by degrees more and more minutely ramify'd, till in the main it fills the content thereof. *Heister* says the human spleen is not exactly like calves, but the veins reach farther into its substance. *Ruyssk* says the veins in calves are presently at an end. The extremities of these arteries are not drawn off as others into *anastomoses* of the veins, but return either into themselves, or into the spaces left every where between the arteries. For it cannot otherwise be understood, that these vessels should run backwards and forwards into one another all manner of ways, without leaving cells of no regular shape or bulk between, thro'out the whole body of the spleen, and thus it is in fact. *Hippoc.* calls the cells *Amplitudines*, *Cryptæ*, *Helices*. *Galen* κοιλοτητας. So that the whole substance of the spleen according to *Malpighi*, who has best described it, from the most nice and laborious disquisition, is a *congeries* of cells and cavities, form'd from and divided by these arterial ramifications, opening into one another, and into the arteries. He describes these cells as membranous, and thinks their origin ought to be deriv'd from the expansion of the coats of the veins, much as the cavities in the lungs seem continuations of the lessning pipes of the *trachea*. This by observation holds good chiefly of the main trunks and first dispersion of the vessels, but the nearer you go towards the end and sides, you find that the main composition of the cells is arterial; the capsular veins only attending them and spreading it self conformably to the principal branches, and this is taken notice of by most authors; it escap'd not *Aristotle's* diligence long ago. *Hist. anim.* iii. 4. But it's highly worthy of observation, that the *capsula* or vein, thro'out its whole progress, till it vanishes away, is punch'd thro' and thro' or perforated like lace quite around, and these holes in a large subject are very wide and numerous, and as big as the very artery in diameter. Thus *Sir Geo. Ent* of the spleen in a horse, "*Ramus splenicus. totum ferè interiore ejus ambitum perreptat multisque*" "*passim foraminibus pertusus est.*" So he describes for us the preparation in an ox thus. About three fingers from its thicker extremity the vein enters the spleen with a very wide mouth, and becomes every where as it were torn and struck thro'. At its first entrance it envelops the arteries and nerves like a common *capsula*; soon after, 'tis vanish'd into broken parcels and filaments. He tells us in a sheep the vessels enter the spleen just by the greater angle where it respects the *pancreas* and stomach. The vein

is

is big enough to admit the point of ones little finger. As soon as arriv'd within, becoming bifurcate, it's perfectly lost into here and there a thin membrane, all along gaping with many and large holes. The artery will scarce equal a larger probe. It's distributed variously hither and thither with capillaries. It reaches the ambient coat, and a nerve always accompanies it. Thus far he. By means of the lace-like holes before spoken of, the whole system of the spleen, all its vascular and cellular *compages* has an immediate communication into this vein, or *capsula*, either backwards or forwards. And if we suppose a stream of water injected by the artery, after it has fill'd all the cavities, it will run in as constant a stream thro' these holes into the vein, and so out again, and *vice versa*. And this is the very practice they take in making all the curious preparations of the part before us. Being afterwards (when the blood by this means is perfectly wash'd out with warm water) blown up and dry'd, if you hold the edges up against the light, or with a sharp knife cut off the whole coat on one side, as was done in making our draught, you perfectly see the structure thereof as we have represented it both by words and prints: Your eye very easily follows the veins enwrapping loosely the arteries, and pursuing them thro' their biggest ramifications, till at length they vanish insensibly. Thus *Blasius* p. 99. says expressly "in a sheep, ox or deer, the substance of the spleen has nothing venular, but the veins end immediately at their entrance thro' the first tunic." And the same is true of all Spleens. Only *Ruysk* says, the extremities of the vessels of the spleen are stronger in human than any other.

SECT. VI. But what's highly to be regarded in the structure of the spleen, is the infinity of little muscular fibres or columns, sagacious Nature has bestow'd on the part, really distinct from the blood-vessels or membranous expansions; "*Fibrarum nervosarum ingens satellitium*, says *Glisson*, "*adeo ut sextuplo minimum reliqua omnia vasa mole sua superent*. *Hipp.* calls 'em *filorum καθαρὰ πλοκή, συμπλοκή*. These likewise observe no manner of conformity, common plane or disposition, but run across one another, from one side of the spleen to the other, from one end to another with every sort of direction; sometime inserted into one another, sometime into the coats of the arteries, sometime into the membranaceous *capsula*, and universally into the inner tunicle. And these fibrous columns must be understood to have their full share in constituting the cells and cavities before said to be between the vessels, from which they are perfectly distinct and of different office. As *Wepfer*, *Higbmor*, *Vesalius*, *Bartholin*, and most considerable Authors universally agree, describing them as small strong filaments without any cavity. *Vesalius* says particularly, "as soon as the numerous blood-vessels have pass'd the *Raphè*, they are suddenly branch'd out into innumerable and small sub-divisions, so that they seem rather solid fibres than vessels. Again, he calls it an innumerable complication of fibres. I scarce durst call them arteries and veins." Here he means the muscular fibres, which he does not clearly enough observe distinct from the vessels. "*Oculatio inspectio*, says *Malpighi*, *hujusmodi fibras filamenta tantum esse tenuia & valida nullam cavitatem habentia nec a venis vel arteriis orta*." *Bidlo* concludes the same. *Riolan* will have it abound more with fibres than vessels; and *Hippocrates* calls it soft and fibrous, *de principiis*. Sir *George Ent* says it abounds with little fibres arising in great plenty from its inner tunicle, for which he supposes the spleen was chiefly made. *Higbmor* says the spleen is compos'd of many fibres and strong filaments wonderfully wrought together,

and many arteries. The fibres of the spleen, continues he, by Anatomists taken for veins, as if they were twigs of the splenic branch, are in reality fine filaments, strong without cavity, neither deriving their original from the splenic vein or artery, but like many nets variously complicated one into another. They are firmly connected both ways to the sides of the coat, from whence they seem to have their original; most wonderfully interwoven, so that in this part Nature has effectually display'd her art, and fram'd such an admirable work, on purpose to confound the fabulous opinions of those that affirm it an idle and useless member.

No GLANDS.

SECT. VII. These fibres (as they call them) are in truth little muscles, and have white tendons at their extremities; and in shape, bating their magnitude, exactly resemble the fibrous pillars in the ventricles of the heart, and pretty much in the whole imitate the structure of the *ovaria* of females. These white points probably by very great Authors have been mistaken for Glands, tho' they confess they never could be ting'd with injections even of ink, which certainly would affect them had they been true glands, which are only continuations of the capillary arteries. And 'tis very common in this part to reach the lymphatics by such injections. 'Tis strange *Malpighi* should be confident these are true muscular fibres, and consequently the instruments of contraction, and yet not observe these white bodies to be their tendons, when at the same time he says, he could by no means observe any cavity in them, and to what purpose should they be thought glands, since no excretory vessel is pretended to? How unworthy must it seem of the dignity of Nature's works, that these should be made to separate somewhat from the blood on one of their sides to return it again on the other! *Heister Compend. Anat.* peremptorily denies them to be glands, from numerous observations and dissections. He says the little spheric bodies in diseas'd spleens are only like the tubercles of diseas'd livers, and have much less pretence to be glands, because the liver is really a gland, but that the spleen is one wants to be prov'd. *Ruysk* the same in two places, and has particularly demonstrated them to be small vessels. I suppose some that have been injur'd by frequent constriction, and lost their tonic power, because only discernable in diseas'd subjects. *Morgagni* laughs at *Haver's* fluid juice separated therefrom. So *Glisson* says, "Beside the vessels just mention'd, that is, the veins, arteries and nerves, there are no other to be found in this *viscus*. Some indeed have thought that besides, a peculiar excretory vessel was given it, and that it empty'd it self into the pancreatic channel. But I my self, after a most careful scrutiny upon this very head (for formerly I favour'd this opinion) could never find the least of it, and do confidently affirm there is no such thing." Mr. *Behm* in *Phil. Transf.* N^o 34. p. 651. concludes 'em not nerves turgid of animal spirits, as *Higbmor* imagins, but the tendons of the fibres, serving for dilatation and contraction as in the lungs. And we cannot possibly allow them to be other than cortortions of the arterial extremities, resting upon the muscular pillars as a stay or prop, where there are no *anastomoses* of the veins for them to inosculate into; and where they reach not so far as the ambient membrane: or at least were they real glands, that they serve only to lubricate the tendons of the muscles as is practis'd in other parts; and showing themselves more particularly when swell'd in a morbid *diathesis*. And *Malpighi* observes they are oblong, and that the extremities of the arteries twine about 'em like ivy, as being the only stable part

part. *p.* 108. he says the arteries, veins and nerves, end either in them or in the inner coat, which we observ'd muscular, sometime becoming thick like leather. *Deusingius de succ. nutrit. comment. novo, p.* 225. delivers his opinion, that the use of these nervous fibres in the spleen is to give strength to a loose and spongy bowel. These fibres seem to arise principally from the inner membrane, which appears chiefly compos'd by the expansion of their extremities, thrown out upon it like *radii* from a center. They are compos'd of a bundle of filaments clap'd together like other muscular fibres, whose productions fasten themselves upon the next adjoining membrane, *capsula*, vein, artery or whatever comes most commodiously in their way. *Malpighi* has carefully enquir'd whether they were hollow, and pronounces in the negative. That the spleen cannot possibly be a gland is not only well concluded from its structure so different from other glands, but because there is no excretory duct, nor can the great diligence of all anatomists in this matter have fail'd of discovering it. Where we see many spleens, which is frequent enough, they are ever accompany'd with veins and arteries, but no separating canal. So that the substance of the spleen is an artful composition of caverns and honeycomb-work made by the arteries, veins and fibrous pillars or little muscles delicately enterlac'd one among another, of various magnitude and figure, without order or regularity, according to the room and situation allow'd them by the permeating vessels and fibres, mutually supporting and supported. The venular membranes too or *capsula's* which are so perforated and compose the larger cellular *sinus's*, are still bespread with arteries and nerves. All this is as prolixly demonstrated by the great diligence of *Malpighi* as most evident upon *Autopsy* beyond possibility of doubt. It somewhat imitates the lungs or cavernous bodies of the *penis*, therefore light, like a pumice stone, when voided of blood. How just then are the sentiments of the great *Hippocrates* i. *de morb. mulier.* where he calls it *Rarum & spongiosum velut alter pulmo.* *Cels. Gal.* In another place *Hipp.* calls it *αεχνοειδης* like a spider's web or net, *reticulum*, whence the *French* now call it *la ratte.* *Martinus. Hipp.* from its fibres, again, calls it *πλωδες τε η ελικωδες*. Inspection of a prepar'd spleen shows us sufficiently 'tis a production of cavernous ramifications first longitudinal then lateral dispersing all around as the leaves of fern march from the stem, and so meeting with others running parallel to them. These spaces and *sinus's* are strengthened all the way by vessels and fibres like the beams and rafters of a house by the wonderful art of Nature, so that a clear passage is open thro' one another in the extremities and thro' the holes of the *capsula's* near the principal trunks. And even the very coats, membranes and expansions of the cells are bespread with little arteries and nerves, so that they are ting'd by injecting color'd liquors or mercury. In Table IV. are drawings of the human and some other spleens, but it must be own'd Nature eludes the utmost diligence of the graver. TAB. IV.

SECT. VIII. This contrivance in Nature can serve to no other purpose than most effectually to form a sponge, which when fill'd by the arterial blood, can at pleasure upon its contraction throw it all out again into the great channel of the splenic vein or back into the artery if it be not too full. Because thro' these interstices and perforations there is the freest communication imaginable, between the two systems of vessels, without danger of stagnation or obstruction. The reason therefore is plain why the muscular fibres arise chiefly from the inward membrane, which too is endow'd

dow'd with the same muscular force, perfectly adapted to exert their constringing faculty, beginning from the outside and pressing inwards in action: effectually bringing the whole body of the *viscus* into a less space, as the hand does a sponge by embracing it on all sides: so that its superficial dimensions are reduc'd without wrinkling. This is the evident consequence of its structure, and no other. No possible pretence for any excretory vessels after the nature of a gland, nor any fluid that can pass or repass into these interstices but blood, beside that of the animal spirits into its little muscles, whereby they perform this action as other muscles, and for the sake of which so large branches of nerves are bestow'd on the part. For it's not sufficient that the spleen should barely suck up any fluid, or that the blood should only run out and in thro' it, which too would not have been without its use, and must have been the case was its composition blood-vessels alone; or as *Malpighi* compares it, that these fibres should only like iron cramps in a building, sustain and connect this soft and vascular bag of the spleen: But further it's necessary that it be master of a power of action, of giving an *impetus* to the blood, of receiving one from it again, by the complicated contractions and relaxations of its muscular fibres. Like the *systole* and *diastole* of the heart, to which *Malpighi* compares it, *Phil.transf.* numb. 71. p. 2150. where he firmly demonstrates, the little pillars in the spleen, that form the network and cells thereof, to be really carnos and muscular fibres, contracting the sides and body of the spleen, exactly after a similar manner with the ventricles and auricles of the heart. And scarce any author that has wrote upon the part but speaks of them, so obvious they be. As *Blasius* in a dog, *Borrichius* in the civet-cat, &c. And hence the Ancients deriv'd their famous *vis expultrix* which enables it to squeeze out the *atrabilis*. *Malpighi* takes particular notice of a membrane in the spleen distinct from the propagations of the venular *capsula*. This is deriv'd from the proper or inward coat of the spleen, and doubles it self upon the entring veins and arteries, and accompanies all their ramifications on one hand, on the other it perpetually sends its fine films and expansions from all the concavity of its inward surface upon the fibrous pillars and cells and cavities, and so probably meets the expiring extremities of the arterial pipes. And all this seems of vast use in defending the veins, arteries, nerves and fibrous pillars from abrasions and injuries, resulting from its frequent acts of contracting and squeezing the blood backwards and forwards. This likewise as was observed of the venular *capsula* is cut thro' and thro' with many holes, sometime forms pipes like the other vessels, and sometime caverns and cells. And in this, many of the fibrous columns are implanted, from this many of them arise, as they traverse all manner of ways the body of the *viscus*. " *Glisson*, p 521. makes it a great question to what purpose are its muscular fibres, so peculiar to the part, every thing else of its contents being common. And concludes that it must be of some publick use to the body, and that use must be deduc'd from what is peculiar to it, as the gall-badder shews at once the intent of the liver, the ureters of the kidneys, the *aspera arteria* of the Lungs, &c. But we may go a little further than *Glisson*, and enforce the argument with double strength. For if the muscular fibres in the *penis*, in the lungs, in the ventricles and auricles of the heart, in the *ovaria* of *females* are most evidently design'd for contraction and relaxation in their respective organs, we may reasonably conclude the splenic fibres, which are perfectly the same, are design'd for the

the same purpose. And as Sir *Geo. Ent* said before, for the sake of these muscles was the spleen made. Hence therefore we affirm the spleen to be an animal sponge, that its action and business is by unbending or shortning its muscles to draw in the blood and force it out again into the venal or arterial systems or both, and to the adjacent parts. This power is under the conduct of the soul by means of the influx of the animal spirits, as in other parts, subject to what we call involuntary motion, perform'd without our consciousness, which is the case of the whole contents of the *abdomen*. The nerves therefore, which are the conduits of these animal spirits, of whose existence in the vulgar acceptance I make no doubt; those great principles of action claim our next regard.

SECT. IX. To give us a true notion of this affair, and without unnecessary NERVES. excursions or tediousness, observe we that the whole system of the entrails, that is, the contents of the two cavities the *thorax* and *abdomen*, are serv'd by two nerves, the *par vagum* or eighth pair and the *intercostalis*, being the two principal ones which chiefly attend upon what we call involuntary action. Which with a constant and equable tenor of spiritual influx maintain the first, great, and uninterrupted natural functions of life: the digestion, distribution of the aliment into the blood, and circulation of it thro' the whole body, from whose ocean all other streams are deriv'd and maintain'd. These two, among others, arise from the *cerebel*, that they may not be disturb'd with the tumult of such as are subservient to our spontaneous actions and passions. The first or *par vagum* is distributed to all the parts within the *thorax*, the lungs and heart, and by what they call the recurrent branch, to the wind-pipe and gullet. Besides it descends thro' the diaphragm and wholly furnishes the stomach, and there properly speaking it ends. The *intercostalis* arises from the fifth and sixth pair, and is destin'd to the rest of the *viscera abdominis*. Nevertheless these two may well be reckon'd as sisters or twins, not only because in brutes they are perfectly united, or but one trunk at least inclos'd in one membranous *capsula*, till they arrive near the heart: but because in human, tho' they be all the way distinct branches, yet concomitant and frequently communicate by intermediate nerves. Besides that the intercostal sends several sprigs into the same parts originally furnish'd by the *par vagum*. As is observable upon inspection of the schemes publish'd by *Willis*, *Vieussens* and the great *Eustachius*, and from which chiefly we have drawn Plate V. that nothing might be wanting to give us an exact TAB. V. intelligence of the part we are particularly describing.

The left intercostal nerve, which only is to our purpose, has a superior excellency to any other, in that it claims so numerous origins; for it not only primarily arises from the body of the fifth and sixth pairs, wholly bestow'd upon the muscles of the face: but likewise it receives a new additional twig thro' every joyn't of the *vertebræ* directly from the spinal marrow, as it passes the whole length of the spine, even to the extremity of the *Os sacrum*. So Nature has most eminently provided against any possibility of failure of the nervous juice in this channel, from obstruction or luxation, seeing here are so many branches all running into one. The reason of this procedure seems to be, that it serves the guts, bladder, &c. parts membranous, glandular, and cold, which needed plenty of the vital flame deriv'd from the brain to assist their functions, but more eminently because it pertains to the spleen. This intercostal immediately at its emersion out of the scull forms a great *plexus* or knot call'd *ganglioformis*, which sends a communicating branch into the other like *plexus* of its neighbor the *par vagum*, and like-

wise a sprig to the sphincter of the gullet. I need not mention, that at the same time it receives into the said *plexus* a branch from the spine thro' the first *vertebra*. Then in its descent at the middle of the neck it forms another and larger *plexus* peculiar to human kind, which sends many twigs to the *gula*, *trachea* and arteries thereabouts, particularly joining with the *nervus recurrens* of the *par vagum*. Besides, it sends one communicating branch at least to the *par vagum* directly. Further it sends many to the main province thereof, the heart, and all the great arteries that arise from it. It has an especial share in constituting the great *plexus cardiacus*. Further it lends assistance to the diaphragmatic nerve, and still a little lower than the *plexus*, detaches a solitary branch from its trunk towards the said *plexus cardiacus*. So large and noble is the province of the intercostal nerve, and so wisely has Nature caution'd for the great motion of the heart, in case its proper nerve the *par vagum* should receive any injury. It must be noted, that hitherto the intercostal and *par vagum* in brutes are wrapped up in one coat, as tho' they were one nerve, and go not separately as in Men.

Now our nerve having run the length of the neck, enters the *thorax* under the clavicle, where falling directly upon the axillary artery it ties a rope round it, and immediately forms another great *plexus*, receiving many nerves thro' the *vertebrae* from the spine. This *plexus* is call'd *intercostalis*. After this it descends thro' the length of the *thorax* upon the origin of the ribs, receiving a vertebral nerve at every joint of the spine, but sending none away till it is arriv'd into the *abdomen*. Then it becomes bipartite, dispatching a great branch call'd the mesenteric, which presently too becoming bipartite, with one it forms the *plexus mesentericus sinister*, call'd likewise *stomachicus*, and *lienaris superior*, with the other the *lienaris proprius*, and likewise the *renalis*. 'Tis far beyond my purpose to trace in this discourse (which is but too tedious already with mere description) all the progress of these nerves to other *plexus's* and parts of the lower belly, their various combinations and divarications: seeing there are no less than seven of these *plexus's* serving to the multiform contents thereof, and intercommunicating one with another a thousand ways: we need remark no more, than that the lienal *plexus's* communicate by great variety of nerves with all the parts near the spleen, or rather with all the bowels in general; as particularly the stomach, the *pancreas*, the liver, the kidneys, the ovaries and parts of generation in both sexes, the *colon*, and by means of the great mesenteric *plexus* with all the guts. It must be observ'd too, that Nature very bountifully upon this favourite branch carries many of the vertebral nerves as they have pass'd the main intercostal, and likewise by means of the hepatic *plexus* it communicates with the intercostal of the right side. Nevertheless if there be any part to which we may guess the spleen is nearer ally'd upon account of its nerves, 'tis certainly the stomach, whether apparently they go in much greater number from the lienal *plexus*. *Vide Plate V.*

Our business is, after having conducted the mesenteric nerve to the spleen, to give a clear *idea*, if possible, of its introduction and dispersion thro' its fabric, as afore of its veins, arteries and muscular columns: so that its whole composition being taken in one view, we may with greater boldness begin to explore its use. The mesenteric nerve from the intercostal, strengthened with several derivative branches from the spinal marrow, with its first division just under the spleen, forms the *plexus lienaris*, the largest of any except the great mesenteric. This sends forth many
nerves

nerves upon the coeliac artery marching directly to the spleen, they are generally in number 4 or 5, but presently branch out into many more; some of these, as soon as they arrive at the body of the spleen, turn off to the stomach, going backwards and upwards by the *vas a brevia*, and uniting with the *nervus stomachicus inferior* in the left side of the bottom of the ventricle, where likewise they meet with a vast number of twigs coming from the said *plexus lienalis* directly. These 4 or 5 nerves going to the spleen, before they enter the substance thereof, in conjunction with and enwrapped in one common sheath with the other vessels, unite frequently one into the other, diverging and converging by way of communication, almost as the vertebral nerves with the intercostal, or as several vertebrals unite to form one great trunk, to go to the legs and arms, as may be seen in *Willis's* and *Vieussens's* schemes, or as we find the construction of the thoracic duct, where collateral branches unite and divide again. This artifice confirms our deliver'd opinion of the spleen's action as a sponge, of its power of dilatation and contraction; for why are many nerves united into one, or whence the inosculations of the chyle ducts, but for fear of a compression from the *vertebrae* or other obstruction, which happening to one branch is remedied by the freedom of another? but here seems no danger, that these delicate tubes of the lienal nerves should suffer from any thing but the great plenitude of the contiguous vessels of blood, whose sudden swelling from the contractive force of the spleen, might give a check to, or rather totally stop the current of the animal spirits or subtle fluid running in them, which would effectually prevent the spleen's muscular fibres from executing their assigned office upon necessary occasion. This is more obvious by considering that in their farther progress, when these wandering threads unite again into one or more chords, and are pass'd nearly into the spleen, they sometime run along the artery and sometime the vein, by which wonderful and most sagacious apparatus of Nature, unless both vessels and at one instant should suffer from too large an extension of their contained blood, the nerves will be free, and their canals open, at least in a sufficient number. This inforces our conjecture, and intimates the extraordinary provision made, that the action of this sponge should not invalidate its own office, which would be a vain and absurd work: that the contraction of its muscles should not hinder the passage of the spirits, by extending the cavity of the vessels, which causes its muscular contraction. We see the same purpose in Nature's view, in that two nerves always accompany an artery, one on one side the other on the other side, and frequently meeting, as *Willis* says, tie the artery about as with a chord. Likewise that the veins and arteries enter the spleen in many channels, and distant, not in one or few, or near together, as in most brutes; that in contraction, and perhaps occasionally unequal compression of the body thereof, some at least of the passages should be open for the fluid forc'd out of it. Add to this that the *Raphè* is hardish, and favors the vessels running for a short space along it between its sides as in a furrow. Thus the blood-vessels, more particularly the arteries, accompany'd with two or more nerves of different bulk thro' all their divisions, and enclos'd in a membranous *involucrum* like a sword in a sheath, and to which likewise they impart net-works of their twigs as they go along; all together, but as to different branches at different ports, enter the *Dædalian penetralia* of the spleen. After this the nerves are dispers'd thro' out the whole texture thereof, till they plainly become imperceptible, and this chiefly upon the

the arteries: not only because the nerves thro'out the whole body take all opportunities of accompanying the arteries, whence they receive so considerable a warmth; but likewise because the main substance of the spleen is arterial. For as *Malpighi* says, the larger trunks of the arteries do not communicate with the veins by *anastomoses*, or one continu'd trunk as in other places, but open into the caverns and irregular cells form'd by the protracted and expanded extremities of the venous membranes, as far as they reach. So he affirms the nerves enter and unite and divide with every and the utmost ramifications of the arteries, included in the same *capsula*, and the very *capsula* is o'erspread with arteries and twigs of nerves all the way, as is usual with others. The same acute observer adds, that the nerves are not only cover'd with a membrane, but likewise impart a membrane or sheath to all the muscular fibres or network of columns, which we have before shewn to compose so great a share of the spleen itself, and which, no one can doubt, are the instruments of its action; and this adds to their common security against the pressure of the circumjacent parts, and communicates more readily the spirits from the nerves to the muscles. In short, it's certain enough that every muscular fibril must have a nerve and artery proper to it self, both which are equally requisites of muscular motion. And are not the little white globules, suppos'd glands, in reality little *plexus's* of the nerves, like those we have already spoke of, and of larger bulk: for it's not to be doubted but the nerves may be trac'd into them? they may be therefore the *stationes*, the *diverticula* of the spirits, as *Willis* says of those larger.

SPLEEN very
NERVOSE.

The accurate *Glisson* assures us, the extremities of many nerves manifestly terminate in the muscular fibres. And tho' the fibres do not seem continuations of the nerves, yet plainly they have an intimate commerce therewith, *i. e.* receive the animal spirits thence for their contraction, seeing they have no relation to the other vessels. We have shewn before, that the muscular fibres arise chiefly from the coats of the spleen. So Sir *George Ent* observes in an horse, that the nerves chiefly are inserted into the coat, and thence by innumerable sub-divisions into its substance, by that means best providing for its action. He tells us in the spleen of an ox, four nerves, two greater and two less, encompass the entering artery as with a scabbard; upon their introduction they disperse themselves to the infinite fibrils coming from its coat. *Glisson* and *Wharton* pronounce right of the nerves being individual companions of the arteries: in which point *Vesalius* and *Veslingius* err, in spreading them only externally. And in general it's observ'd by all Anatomists, that the nearer the nerves approach the spleen, the more they increase in bulk as well as number, even as after they are conducted into the substance. And further that its coats are more than ordinarily o'erspread with nerves to that degree, that sometime they have been mistaken for chyle-ducts, as *Bartholin* notes out of *Sperlingius*. *Glisson* and most Authors observe, that this part abounds rather more in nerves proportionally than any other, which would engage us to think 'tis no useless one or supervacaneous.

Not USE-
LESS.

SECT. X. The consideration of the intimate commerce between the stomach and spleen by means of these nerves, and of both with the brain thereby, has induc'd some to make our spleen the seat of the vital flame, or as a lamp plac'd under the stomach to warm it by its sparkles, like a culinary fire under the pot. *Mayow* assigns it an office of volatilising the ni-

trous

trous salts of vegetables into animal. *Helmont* scrupled not to place the throne of the soul here, the *sedes archei, veneris nidus, hospitium animæ*; whence sharpness of wit and sagacity is generally said to arise from the spleen, and *Lienosi pro ingeniosis habentur*. *Hipp. de princip.* pronounces the temperature of the spleen hot. We know 'tis a common observation in our practice, that the modish disease call'd the vapors, and from its suppos'd seat; the S P L E E N, does most frequently attack scholars and persons of the soft sex most eminent for wit and good sense. Therefore it highly behoves our profession, not from the difficulty to reject the disquisition, which can only be the *asylum* of ignorance and idleness, but assiduously to pursue Nature's footsteps thro' her most intricate meanders, and by invincible perseverance urge her at length to reveal her purposes. No one certainly that has but just dip'd into the anatomy of an animal body, and seen the amazing appearance of inimitable beauty, design and contrivance, thro' every minutest piece and member thereof, would imagine that the spleen, boasting of a preheminance of structure, at least that it is inferior to none in the curiosity thereof, should be as it were a casual stroke and fortuitous job of almighty workmanship; but that it has its great uses equal in dignity and necessity with any other. And yet how many good Anatomists, after much pains and useless toil in its consideration, have as in a passion, at last concluded, it had no use or intention at all, and might as well have been omitted in the animal frame. Whence we meet with the odd fictions and conceits in Authors about it. Such as *Aristotle's*, who fancy'd the spleen was made only for a kind of stay or prop to the vessels, as an anchor holds a ship fast, or as the poles that support the plantations of a vineyard. At other times he makes it a kind of *pseudo-hepar* or mock-liver, and that it diverts the wandering vapors from their fancy'd ascent to the head, iii. 7. *de part. animal.* Such *Spigelius* declares his sentiment. *Plato in Timæo*, and *Galen* v. 7. *de usu part.* nominate it *ἥπατος ἐκμαγόν*, *hepatis expressam imaginem*, a counterpart, others more rightly render it *mantile* a wiper or cleanser of the liver. *Jul. Pollux* ii. 4. *Oribasius*. When 'tis apparent to any one that examines it with but moderate exactness, and from our foregoing discourse, that there is in reality no similitude, analogy or conformity between the spleen and the liver. Wise Nature will abhor so mean an artifice as to throw it in only as a make-weight, to keep up an *æquilibrium* between one side of the body and the other, as *Isidore* thinks; deservedly reprehended by *Vossius Etymolog.* But I rather suspect they mean by this term, the same sponge-like quality as I here assert.

SECT. XI. It does not obscurely appear, that these contemptible notions of this noble part have gain'd ground, if not their original, from many stories of the spleen being cut out from creatures, without any or much visible detriment to the œconomy of Life. Which affair we come next to consider and represent in its true light, and what experience has gather'd thence as consequence; and how animals have far'd after such an excision, and how it may be accounted for, without impeachment of the dignity of the spleen. Cutting out
the SPLEEN.

Several experiments have been made from time to time, of cutting the spleen entirely away from dogs and other creatures. And some Authors contend it has been so far from proving detrimental to them, that several benefits have arisen therefrom, as particularly that they shall be more brisk and gay than before. *Pliny* xi. 37. *Hist. Nat.* says it was a practice with

H

some

some to cut out the spleen from dogs to make 'em swifter in running. *Rossetus* says the *Turks* cut it away from greyhounds, or burn it, for the same purpose. *Morgagni advers. anatom.* ii. p. 54. affirms, that *Zambecarius* in many dogs made the experiment, and always found them brisker; he himself observ'd the same. As likewise *Malpighi. Apfyrus* 1. 40. *Veterinariae* mentions some burning it in horses for the race, but disapproves it. Sir *George Ent* in his apology says, he knew a dog lived some years perfectly well without it. Doubtless the first intention of this experiment was founded upon the supposition of the spleen's being an useless weight. Because they could not find out its use, by a general vote they concluded it had none. And this conceipt is as old as *Aristotle*, as we hinted before. But he speaks plainer in one place, and says directly that it is an useless member: III. *de part anim.* And after him, his grandson *Erisistratus* in *Galen* idly fancy'd, Nature created it to no purpose, or only for regularity sake, and to answer the liver. Touch'd upon by *Plautus* in *Mercatore*, commented in *Vander Linden's Cappadox lienosis*. *Ruffus Ephesus* calls it an idle member, doing no manner of work. *Democritus* in his epistles to *Hipp. de Nat. human.* had said so before.

These reports have emboldned people to that degree, as not to scruple the cutting it out of living persons. *Franc. Rousetus de partu caesar.* c. 5. knew it cut out from a human body without harm; he says, p. 154. that at least some parts or pieces of it have been taken away several times. *Viardus* a Surgeon swore, that he had done it twice, and cur'd the people. *Ballonius* did cut it away when it stuck beyond the ribs. *Leonardus Fioravantus* a famous emperic, and the first mountebank in *Europe*, affirms confidently, that at *Palermo* the metropolis of *Sicily* he open'd the belly of a certain splenetic Woman, and took out her spleen weighing 32 pound, whence she was cured; but the truth of this story, says *Fonseca*, I suspect. Indeed *Aretæus* iii. 14. says, he has known parts of it come away. See innumerable instances quoted by the industrious *Drelincourt*, p. 137. *de lienosis*. But after all, *Bartholin Cent.* iv. *hist.* 51. says, *Lienem tuto eximi posse nobiles ejus usus dissuadent*. He thinks what *Pliny* has reported fabulous, and I imagine much of a piece with that story in *Vitruvius*, i. 4. where he reports, that the sheep in *Crete* live without livers, because they eat much *Scolopendrium*, which our old simplers call milt-wast, *Asplenium*. *Pliny* is so weak as to believe it. With *Riolan* I judge this dangerous operation, if it can be perform'd, is far from rendring the body more active and brisk, at least for any considerable time, and ought justly to be suspected, because of its vast vessels, as *Tobias Knoblochius* is of opinion, *Instit. Anatom. disp.* 7. as likewise *Levinus Lemnius* ii. *de complex. c. ult. in princip.* *Tagaultius* and *Hieronymus Fabricius* write that all wounds of the spleen are mortal. Indeed a piece of it may perchance be extirpated without much harm, or possibly it may be some supernumerary spleen, whereof there are many instances: some we have recited in the description of the part. But if we consider the number, connexion and largeness of its blood-vessels, and the great *plexus's* of the nerves: none but a madman would pretend to cut it out by choice. The experiment is highly to be doubted, cannot promise a long life, if immediate death ensues not. *Cael. Aurel.* iii. 5. *tardar. pass.* denies the possibility of it. " *Decidi aut auferri lienem, voce quidem dictum non officio completum accipimus*, says he. *Higheimer* denies this exsection with a great deal of argumentation, and *Havers* too.

too. *Vidus Vidius de curat. Membr. x. 10.* thinks this operation impossible, and the life of the animal fav'd. *Lindannus* in his *Physiolog. c. 6. p. 67. L. vi. c. 9.* says, "they who think the spleen can be extirpated by cutting out or burning, to me truly seem never to have seen one in the body, or if they have, to be as wise as the person in *Ætius*, who thought it possible for a man to live without a head." May it not be accounted an extraordinary chance; as *Forestus* has taken away all the *omentum* in a young man, and *Riolan* in others, without any inconvenience? *Rossetus Tract. ii. p. 154. Ed. Paris. 1590.* says, pieces of the *omentum* are daily cut off. Even the womb it self has been safely taken away, as *Bartholin* shews in his *Epistles. Vid. Plaut. in Mercatore. Geo. Bettinus Medicina xviii.* and *Rossetus* produce many instances of it, p. 334. The kidney has been cut out by some bold inquisitors.

SECT. XI. 2. Nevertheless, 'tis certain this experiment has been try'd frequently upon dogs, cats, &c. and first in *England*, as *Bartholin* confesses; and it's become a necessary piece of diversion among young Anatomists in the universities. But it's a great misfortune that there are very few accounts of the consequence, from observation of some years time after, what conveniences or inconveniences ensu'd, and how long the creature would live in a good state of health and the like, from whence we might deduce any doctrine with certainty. *Brunner* made some odd and desperate tryals of this sort, but had not time to conclude any thing from them. It's obvious to any that are acquainted with experiments to how much fallacy this is liable, how great care and judgment is necessary, beside patience, to make any observations of this kind, so as that they may be useful, and serve for a rational theory of the part; for I can never be persuaded but that it must make a huge alteration someway or other in the animal œconomy. *vide Mebium, and Diemerbr.* As to the experiment it self, the honor of reviving which *Bartholin* so clearly reserves to the *English*, Mr. *William Becket* Surgeon out of his curious researches has inform'd me, that upon enquiry about what time and by whom it was first done, he finds that Mr. *Gillam* and Mr. *Alexander Read*, two *London* Surgeons, first succeeded in this operation upon a dog in the house, and in the presence of Dr. *Bonham* an eminent Physician. They first made an incision four inches long, thro' the integuments of the *abdomen* on the left side of the dog, close under the short ribs, then drew out the spleen, tied the blood-vessels, and cut it off near the ligature; then they stich'd up the wound, and left it for Nature to heal, which was done in a short time, but that about six weeks after the cure was compleated the cur grew mangy. We are to observe that these two Surgeons were very eminent for their practice in the beginning of King *James* the first's reign, and that Dr. *Bonham* dy'd in or about the year 1624. But in the year 1671, one Dr. *George Thompson* a boasting chymical Physician, in a pamphlet he published, positively asserts that he was the first who perform'd the operation compleatly, and that the dog lived about two years after, and was lost by accident. That Dr. *Currer* told him the honorable Mr. *Boyl* offer'd to give five pound for the dog: that the success of this operation was well known to the Marquiss of *Dorchester* the founder of our library, Dr. *Harvey*, Dr. *Tern*, and divers others. That after this some Surgeons in *London* perform'd the splenotomy upon another dog which lived long after. But all this seems to have been done a great many years after the first experiment. Dr. *Flud* has seen the experiment try'd.

Its History.

All

All that can be done therefore, is to enumerate what has been observ'd upon cutting the spleen away from animals, that we may reasonably believe. My reflections thereon will be casually interspers'd, in what I afterwards propose, *viz.* to deliver my present thoughts of the use or uses of the part: and then to execute the intent of the worthy founder of this exercitation, Dr. *Gulston*, I shall recapitulate what discoveries and appearances the anatomic knife has afforded in opening morbid bodies, and especially such as have dy'd of any distemper relative to the spleen; from all which I will presume to sketch out some history of its indispositions, and their method of cure. The alacrity with which I do it, is owing to the opportunity afforded me before this specious and learned Auditory, of reviving some old notions of our predecessors which were nearest the truth, tho' their reasons, as commonly understood, were not so adequate to the genuine principles of Nature, which after-researches and improv'd philosophy will dictate to us. Let us notwithstanding admire the penetration of the venerable sages of our faculty, who certainly had excellent courses of remedies in distempers they could not so well account for as we; and let it be our ambition and glory to pursue their track, and improve upon them for the benefit of mankind, and honor of the healing art. *Drelincourt* in his *Epimetra* gives good reason to believe the Ancients really knew many secrets in anatomy and physic which after-ages have claim'd as their invention; however let us endeavor to advance the stock and sacred *depositum* they have left in our hands, and rescue the human fabric, that miracle of bold nature as *Zoroaster* calls it, from its concomitant infirmities and diseases.

CONSEQUENCE.

SECT. XI. 3. What has been observ'd upon cutting away the spleen from dogs is, I. That they become more gay and brisk than before, and swifter in running, as they fancy, tho' others affirm quite the contrary. II. That they become more voracious, but frequently vomit up their food before digested. III. That they become more falacious. IV. That they make water more frequently; *aliaque patiuntur incommoda*, *Waldsmidt* adds, but tells us not what they be. V. That they become scorbutic or mangy. VI. That after their Death the liver is found thicker and larger than usual, and so dry'd that it may easily be broke to pieces. As to the appearance of the circumjacent parts: In that experiment of *Malpighi's* where he only ty'd the vessels going to the spleen, which is the same thing in effect as cutting it off, and certainly a much safer way: the blood-vessels about the stomach, *omentum* and liver were extraordinarily extended and full; their smaller ramifications enlarg'd to a huge degree. The splenic vein in particular was strangely tumid, tho' the spleen it self was wasted away; beside the liver was increased very much in bulk, reaching farther than ordinary toward the left side, and was sensibly protuberant on the right side under the ribs, even before the dog was dissected. In all other respects there was no difference, the blood being fresh and lively. VII. I have been told that this experiment has made dogs fatter, others have said, that it takes away their churlishness and fierceness, others that the color of their water is alter'd thereby. VIII. *Waldsmidt Disp.* 27. says, that by experience they seldom live above 3 years after it.

From this and all the large fund of the history and description of the spleen laid down before us, I see nothing but what seems to confirm my position of the spleen being an animal sponge, not a gland to separate any juice, but a receptacle of pure and good blood for great and wise ends in Nature.

Nature. That by the mode of its construction it must have a power of admitting this blood and returning it again with an arterial force, but that it differs from arteries in this, that it forces it not forwards towards the extremities, but back again by the same conveyances it receiv'd it. That the eminence and dignity of the spleen appears not a little from its fine structure, the safety of its residence, and Nature's great care in its positure under the ribs and towards the back, whence notoriously guarded from external injuries. The extensiveness of its communication with other parts, the great command it has of the current blood in the abdominal arteries and *vena porta*, the near intercourse it has with the stomach, the copiousness of its blood-vessels, nerves, lympheducts above other *viscera*, all proclaim its excellence. Add to this that it is given to all creatures having blood, that its form and bulk is more considerable in more perfect animals and most in men. That therefore it's highly expedient to vindicate the honor of anatomy, in endeavoring at least to discover its use.

That I may not be wanting in my part toward this great purpose, I shall offer some notions that have occur'd to me thereon. I only propose them to the world to be further consider'd, if they chance to merit it; especially in this place where a perpetual succession of Anatomists will certainly keep up the dignity of that science, which from *Harvey's* theatre and *Harvey's* doctrine has receiv'd so vast improvements. And I shall rather chuse to abound in heaping up several hints, some of which, in my own opinion, deserve no great stress or enforcement, than omit any thing that may possibly tend to the incitement of others, to exert some new pains in this curious enquiry. For we must not think anatomy is arriv'd to a tolerable degree of perfection, whilst we hesitate so much upon this elegant *viscus*; which (I hope to make a little probable) has so much weight in the animal oeconomy.

SECT. XII. Because we find the spleen full of nothing but blood; and because all or most such like bodies are glandular, Anatomists have wearied themselves in an eternal search for the glands here, and for the conveyances of the secreted juices. Some have fancy'd or invented one going to the stomach, to the kidneys, or this and that part, which Nature has not acknowledged; especially the excessive number of lymphatics so conspicuous on its surface, has prompted them to favor this qualification. But in truth the most keen-sighted enquirer could never discover any other excretory vessels from the part, nor any glands within its cavities to furnish them, as the accurate *Glisson* after a most diligent search confidently affirms. And upon a due consideration of its structure it plainly appears impossible there should be any, or which is the same thing, that they must be useless and supervacaneous or morbid figurations: therefore we may well supersede any further pains in quest thereof. And as for the lymphatics spreading themselves on its outer membrane, in common with all the other *viscera* and members, assuredly 'tis no primary intention of Nature in formation of the spleen, and with *Monf. Tawry* we may think there is nothing remarkable in the passage of the blood thro' it. That it can receive no other alteration there, than losing a good deal of its lymph: whence sometime we find it thick and black, or at least think so. But *Glisson* is positive and with much reason, that the lymphatics have no manner of relation or dependance on the structure of the spleen: and if by any contraction of its muscles it squeezes the blood again into fusion, as do the lungs, 'tis no more than restoring

USE I.
LYMPHÆ-
DUCTS.

what the other had taken away. Its action therefore being only relaxation and contraction, the one to admit the blood both venal and arterial, the other to force it out again, as is notoriously deducible from all the premised account of its fabric, vessels and situation: whatever of a gland-like office it exercises, is only occasional: Nature wisely laying hold of the opportunity of implanting numerous lymphatics upon a part that is full of blood and well able to bear such an expence, because destin'd to no other secretion. 'Tis only, in all the *viscera*, as it were, a work of supererogation, the whole contents of the *abdomen* and *thorax* contributing indifferently their share of lymph, as they are most able, to promote the motion and fluidity of the chyle in the thoracic duct: No one peculiar gland being form'd purposely and solely for that end. But it's observ'd the lungs, *penis*, womb and all such sponge-like bodies, being much of the same substance with the spleen and abounding with blood, abound more proportionably with lymphatics than any other, and this is the reason of gleets so troublesome to be stop't in those last mention'd parts, after the erosions of a *Gonorrhoea*. The spleen therefore of right lends its assistance in this point more largely, having by means of its innate action and of its situation between two great systems of blood-vessels, the ready means of preventing any injuries to it self thereby, by calling in fresh supplies of the purple fluid; and this is but correspondent to the constant practice of Nature, who serves many ends by one contrivance.

The lymphæducts going from the spleen are very many and very large. For it must be noted many of the capillary arteries in the body thereof, branch'd out as we before observ'd *ad infinitum*, are inserted into the outer membrane, deriv'd from the *peritonæum*. So that when we separate it, which is done without force, we see an innumerable appearance of small red points on its inward coat, being so many drops of blood spouting from the torn mouths of the arteries. From hence doubtless these lymphatic juices are deriv'd and separated, by small glands in the said outer coat, without any necessary assistance from its internal cells, and fibrous columns, or membranous expansions. They creep along between the two membranes investing it, and breaking thro', encompass the whole body of the spleen like a net. Afterwards as they pass along the cawl, unite into one, and go to the *receptaculum chyli*, having turned round the veins and arteries like ivy branches. *Heister* says a lymphatic gland about the bigness of a bean or nut is oft found without the spleen, upon the entering vessels. This lymph is yellow and sometime reddish as carrying a stronger tincture of the pure blood it's immediately separated from, than from most other parts. *Consule Rubeckii tabulas, Siboldi Hemsterhuyssii Messum auream. Lamy, Nuck, &c.* May not this be one reason of the dog's becoming scorbutic or mangy, upon extirpation of this part, the chyle being thus defrauded of so considerable a portion of its diluting lymph? Life to me appears a curious circulation of the same principles. Certainly salts by their solidity and strength of attraction, arising from the plainness of their surfaces and by their activity withal, claim a vast share in the composition and vitality of animals. All our food; every thing in nature abounds with salts, which the noble laboratory of animal organs sublimates and volatilises for its own use and purpose. It raises, precipitates, exalts and pours 'em backwards and forwards, or cohobates 'em, if we may speak in chymical terms, till they fly quite away. This is converting fixt nitrous salts of vegetables into volatil, which is only done by

by living creatures, and imitated in some manner by our *Sal volatile oleosum*. For every thing (and only) what has pass'd thro' an animal, produces a volatil salt. As Life is motion, and it subsists upon continual taking and expending as the great *Hippocrates* says, therefore is the lymph drawn from the blood in order to be return'd into it again, by the way of the chyliferous ducts, as is the bile, the *saliva*, the juices of the *pancreas*, stomach, guts, &c. and all salutary secretions; therefore are salts thrown into the blood in order to be thrown out again. Of the extraordinary use and necessity of this lymph *Brunner* has treated very largely, *Exp. nov. c. Pancreas*. And since scurvy and such like cases arise from a saline and earthy constitution of the blood, from want of sufficient diluents and convenient exercise and action, salt, dry food, and the like: this among other causes which will be mentioned, seems one that gives rise to the distemper in this circumstance; the blood of the dog running into concretions and stagnations in the capillaries, and producing all the other symptoms of that Disease, which here need not be particularly related.

USE II.
DIGESTION.

SECT. XIII. But let us proceed to what I imagine one of Nature's primary purposes in formation of this curious organ: That is, for an assistant of the great business of digestion, or concoction of the aliment in the stomach: the first and of highest importance of all others, for preservation and support of the *individuum*, the main spring of the wonderful machine, rightly by *Plato* from *Hippocrates* call'd the *primum mobile*, alluding to the imagin'd first agent of the rotation of the huge celestial orbs. This is no new opinion, but rather an old one well started by the Ancients, but neglected by their successors, especially the Moderns. The divine *Hippocrates*, to whom scarce any truth was unknown, thought the office of the spleen was to help concoction, by drawing off the superfluous humidity from the stomach, whom *Aristotle* copies after. Others suppos'd this assistance was perform'd by furnishing the stomach with its acid ferment, whence it excited hunger, stirring up the *vis appetitrix*. *Aristotle* made it, being a sanguineous organ, the concocter of the crudities that otherwise would offend the stomach. Some have thought the spleen's fancied melancholly useful to the stomach, by its acid, austere, styptic and astringent quality, which contracted and strengthened the fibres thereof and enabled it the better to concoct and retain the aliment whilst digested and expel it afterwards, as *Galen* says in the lion, leopard, bear, wolf, pard, &c. and the *Arabians* fell pretty much into this notion, for they always thought it strengthened the stomach. *Avicen. L. i. Fen. i. doct. 4. c. 1. Averroes colliget. 2. c. 8. Tom. 9.* This was said before by *Galen*, by *Theophilus ii. de hom. fabr. Nemsius de natur. hom. Meletius de hom. natur.* Others speak plainly that it is done by good blood and warm: whence the Ancients entertain'd a fancy, that creatures which drink much have larger spleens, whose business is to warm the stomach against such a quantity of cold fluid. *Pecquet, Vesalius, Riolan* and some more have hit upon this, as we shall see by and by.

The Ancients, we said in the beginning, in all these notions thought not amiss. I shall propose to my self to explicate this doctrine in a fuller manner. And truly that the spleen has some great relation to the stomach, seems obvious to the first view, and one would think that a common observer in anatomy should be naturally tempted to conclude so much, when he finds that it is plac'd directly under it, that it has the most large and most intimate communication with it, by means of their common veins, arteries,

nerves

nerves and connexions, and this invariable in all creatures: as we saw by the comparative anatomy we pursu'd so largely in the beginning of this lecture. So that if the stomach in the opinion of *Q. Serenus* deserves to be call'd *Rex totius corporis*, the spleen deserves to be call'd its viceroy. Do we not see the great splenic vein and artery drawn in an horizontal line from right to left, under the whole length of the stomach, and sending forth the *Coronaria seu gastrica major*, the *Gastricae minores sinistrae* three or four in number, the *Gastro epiplois sinistra* and the *vas breve* to the stomach? all these arising either from the splenic or spleen it self, both veins and arteries, and inosculating one into the other encompass the whole body of the left and largest side of the stomach, where (doubtless) chiefly is perform'd the business of digestion. Whence *Riolan* says he has observ'd the left side of the inward side of the stomach of a darker color than the right, as if more torrify'd in that most frequent action. These march off in their direct way to the spleen. All the rest of the vessels that go to the right side of the stomach, arise upon account of convenience of situation, only from the opposite side of the body thereof: in the arteries from the hepatic, in the veins from the *Gastro epiplois dextra*, which are but continuations of the splenic at their origins, and terminate in those coming from the splenic, inosculating at their extremities in the middle part of the stomach. Does not hence appear the reason why the spleen is plac'd on the left side? not to make a balance to the liver. And why should not the stomach have its proper vessels directly from the main trunks of the great vein and artery, not reflectedly from the splenics, if the spleen had not some extraordinary association therewith? Add, that this conformation is equally respected in all sorts of animals, as well as constant in human. Tho' in a man it is more strictly ty'd to the circumjacent parts than in a brute, as particularly to the diaphragm, and sometime to one part more than another, yet ever annexed to the stomach in both, not by vessels only, but by strong membranes too. *Lienem pertinaciter ventriculo colligantia vasa*, *Vesalius* calls them. As were it necessary to give particular quotations, I might specify the ox, sheep, deer, &c. where the head of the spleen is join'd to the stomach. So in the wild *African* goat, whose spleen is shown in Plate IV. Fig. II. from a preparation of Mr. *Nat. Smith*. So hedgehogs are strongly knit to the stomach by a membrane and many veins and arteries. That of a mole immediately adheres to the stomach as a dog's: as in the *cuculus*, the *tursio*, the *torpedo*, &c. just by its upper orifice. In a sea-calf the splenic is beset on each side with many branches like ribs running from it to the stomach. In the *raja*, says *Steno*, because the liver divided into three lobes fills all the upper part of the *abdomen*, the spleen lies in the middle under the liver and between both orifices of the ventricle, join'd to it by blood-vessels. *Blasius* says the monkey's is small but sending many branches to the stomach. *Riolan* says there are as many different figures of the spleen as men, and he has seen one divided all along into five, six or seven digitations or fissures, yet strictly embracing the stomach with every one. And of the great connexion between the nerves of the stomachic and lienal *plexus* what otherwise can be concluded, than that they are kindred parts and execute some common office?

TAB. IV.

Now let us ask our selves the question, why do the principal blood-vessels of the stomach arise from the splenic in its direct road to the spleen, which is as we have sufficiently shown an arterial *cista* or repository of blood? and why

why do vessels go immediately from the spleen to the stomach, as ordinarily the *vasa brevia*, and in other creatures as particularly a dog, four or five more from the body of one to the other? Certainly we must answer, that the spleen should be a magazine, *diverticulum* or necessary receptacle of the blood for the use of the stomach, ready as all occasions and emergencies require, to run plentifully into the gastric vessels and return as soon, in a part that must so suddenly alter its dimensions, extend its bulk, and contract it self in its great business of digestion. *Glisson* observes the veins and arteries in the stomach are exactly proportionate to one another, *i.e.* of the same bulk, whereas in other parts the arteries are rather smaller than the veins, so that the arteries in the stomach by consequence are bigger proportionally than those of other parts of the body. But this is not sufficient for our purpose, because we may conclude that Nature having provided a proportionate quantity of blood only in the ordinary way of life for the stomach, which for the most part must be suppos'd empty; how would this common distribution answer her intent at the extraordinary times of concoction? From whence must this new resource be produc'd when there are no new vessels over and above? Is not then the spleen at hand to solve the *quare*, or can any thing in nature be imagin'd more adequate or better posited and contriv'd, were it our business to invent and assign any thing for the purpose?

The spleen then must be said to officiate to the stomach by pouring in upon it as it swells in eating, a new quantity of blood, besides that deriv'd in the ordinary course of circulation, which is to procure the required heat and necessary juices in concoction. And that this is not only necessary, but likewise in a very high degree, a little consideration will persuade us.

The stomach, we know, is a bag made up of several muscular membranes HEAT. of contrary directions, thereby admirably calculated not only to enlarge and contract it self, in proportion to the admitted and discharg'd aliment, but to squeeze and agitate it with a various and complex manner of motion, like that peristaltic one of the guts (as I have frequently seen) so as to comminute or digest the food we eat, to the greatest fineness, smoothness and delicacy, and the extremest separation of its parts. This is what we call making the chyle, or reduction of the discordant nutritious substances into a white homogeneous fluid like milk. An operation so wonderful that it has exercis'd the wits of all ages to account for it, considering the seeming disproportionableness of the instrument to the work; therefore is it necessary we should allow it all the assistance we can find. *Tantillam autem partem toti obsonare ut sufficiat, mireris*, says *Glisson*. And he takes notice the stomachs of men are less in proportion to their bodies than other animals. *Aristot. i. 16. histor. animal.* says the stomach is not much bigger than a gut. *Lozelius* says the stomach and gullet when dry'd do not weigh above $\frac{3}{4}$ lb. *Brunner* found the stomachs of owls and serpents no thicker than paper. We shall not here take occasion to be tedious in handling the question of digestion, and reciting the opinions of authors about it, which would be wholly needless to this auditory; observe we that it is promoted by the liquors we drink at meals, and the curious dissolvent the *saliva* we swallow down in mastication, and the juices thrown in by the glands of the inner lining, the *tunica villosa* of the stomach, and the acid ferment always found therein. Likewise by the heat of that and circumjacent parts, by that natural and that acquir'd. All which together must be very considerable, or we have rea-

son enough to conclude, nature's fundamental purpose of digestion would be frustrate or imperfect. Heat, it's notorious, is the chief and most powerful agent in all alteration of bodies, in productions and dissolutions, every renovation of forms. This in an animal body can only, in an equable and suitable manner, be deriv'd from the blood, kindled in the vital flame from the mother, and conserv'd during life in the circulatory mass, by its amazing continuation of motion and addition of fresh food, or fewel as we may properly call it.

Aristotle had such an opinion of heat necessary in concoction that he thought it the only requisite. *ad init. ii. de anim.* he says heat is the instrument of every coction in an animal body. *Hippocrates de prisc. medicin.* rightly adds a fermentative juice, doubtless from observation of such being constantly found in the stomachs of animals: which the good women call cheese renate in calves, and may be imitated by the juice of *gallium*, lady's bedstraw. *Aristotle*, *Anonymus Græcus* and *Galen* affirmed the spleen assisted in warming the stomach: the latter adds, that not only the spleen but the rest of the *viscera* encompassing the stomach, were as so many firebrands under a boiling cauldron. The same is the mind of *Fabr. Bartoletus*, *Encycloped.* 'Tis needless to mention the practice of roasting, boiling and preparing meat for the stomach, to make its work less: of likening it to an oven; of showing the way to make gellies, extract tinctures by fire, or of *Papin's* famous digester; of strong liquors and hot spices assisting, and the like illustrations of this work, whereof there are many and long discourses in authors: but we cannot help taking notice that nature has not fail'd to use all possible advantages of giving the stomach an extraordinary warmth even from its situation. The obliquity of the position of the heart and the reason thereof, as it seems to me, is not commonly remark'd. 'Tis certain that the major part of the heart is inclin'd on the left side the *mediastinum* or vertical partition of the *thorax*. Besides, the flattest side of the heart or that of the right ventricle lies intirely upon the diaphragm over the top of the stomach, so that the heart and stomach are separated only by the diaphragm. The heart then being the *focus* of the blood must needs impart a mighty heat to the stomach, especially when it is fill'd with food and most needs it. The stomach likewise from this vicinity must doubtless reciprocally return its new acquir'd warmth to the heart. Here then seems to be a reason why the heart is turn'd so much toward the left side, in order to favor the stomach, and why immediately after dinner we find an encreased strength and frequency of the pulse. Thus does nature produce a circulation of causes and effects in all her grand purposes: for digestion ought to be look'd upon as a sort of war and strife, therefore the stomach procures this new *impetus* to the heart, in order to reap the benefit of its encreased heat and pulsation, in subduing the food. Proceed we to examin into this affair and we shall find this design still further executed by the huge *viscus* the liver and gall-bladder, almost covering the stomach on its upper and right side, turgid with its hot and fiery bilious juices. Before, is spread the oily woof of the forepart of the *omentum*, behind the under *lamina* thereof, like a doubled blanket to warm and cherish the part. Underneath lie the guts, particularly the *duodenum*, the *pancreas*, the large gut call'd *colon*, generally full of *feces* like a gardiner's hot bed, together with the splenic artery, and on its back part too the great artery, just as it receives the new blood from the left ventricle of the heart, but on its left side and outside where

most

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TUATION.

most expos'd, lies the spleen full of arterial blood. *Lien enim* (says *Plutarch*, *Sympos. dec. 5. prob. 2.*) *spirituum vitalium calore & arteriarum perpetuo motu pollet*: and this is expressly the opinion of *Drelincourt sen. de lienosis*, p. 33. In this view only then, can the spleen be said to be useless, or not rather absolutely necessary to the stomach? does not nature proclaim its great eminence by its situation, being plac'd on the left side of the stomach where digestion is chiefly perform'd, and closing it up as it were like the door of a furnace, that it may have an equable warmth quite around? so that the spleen alone in this single requisite of heat, is oppos'd to all the rest of the bowels put together that encompass the stomach.

Thus posited great must be the heat of the stomach; which was one thing From BLOOD sought for: add to this account the infinity of blood-vessels pertaining thereto, which to me seems more in proportional quantity than is allotted to any other part. *Glisson* observes some capillaries of the blood-vessels go to every minutest parcel of the tunics of the stomach, for tho' they look white they are every where water'd with blood, nor can you prick with the point of a needle into any place but blood drops out. Every one sees how prodigious a quantity of the larger branches on the outside o'erspread and embrace it every way, inosculating one into another, and *velut coma fruticosa obducunt*, as *Willis* has it. These passing inwards, and still infinitely subdivided, terminate in the interior nervous coat of the stomach, so thick, that the points of them when you take off the *tunica villosa* appear like a bloody net, as the last-mention'd Author expresses it. Therefore with him, may we assimilate the stomach thus boiling with hottest blood, on all sides around it, to a kettle hung over a fire. And probably its heat is not much less. The spleen in this work, doubtless claims an equal share with the other circumjacent parts, but may we not surmise its task is much larger than any others, because it only abounds with blood, not for its self whose whole bulk exceeds not the weight of a drachm, but that it may be a help-mate to the stomach, and freely impart what it wants not. The opinions of former Anatomists, says *Vesalius* v. 9. *Anatom.* was, that the spleen threw out that blood which was more than it wanted for its own nourishment, upon the stomach; *magni cujusdam usus gratia revomi*. Now for what purpose should this be but digestion, which is the office of the stomach? Therefore must the spleen be assistant therein, seeing it has in the account of some nothing else to do; and can it perform a nobler duty?

In general, I cannot but think this is one of the sought-for uses of the spleen, and what any one would be apt to surmise upon the first dissection, and having an *Idea* of the system of the parts hereabouts; but after the texture of the spleen is found out to be what we have above describ'd, our notions and esteem thereof rise higher, and we must suspect that such curiosity as nature has there shewn, and such powers as she has given it, will deserve our pains in examining thoroughly the mode and measure thereof, and other collateral considerations that will offer themselves; if we be but fortunate enough to get into one of her own paths, and escape the mazy tracks of error and imaginary fictions.

In the act of digestion, when the surface of the ventricle so vastly and so suddenly encreases, its coats must necessarily become thinner, as more stretch'd out, like the blowing up of a bladder. The veins and arteries

likewise

likewise which so plentifully o'erspread it, and permeate its various folds with innumerable weavings, must equally be extended, and their coats become thinner. From both which considerations it is necessary to conclude, that in this state the stomach is become weaker than before, when there is occasion for more strength. But if strength, *ceteris paribus*, be in proportion to the quantity of blood, the stomach must necessarily want a vast access of blood, if we only suppose its dimensions enlarg'd without regard to the food admitted, for if only the same quantity contained in its blood-vessels during its contracted state, was allow'd it when it's stretch'd to ten times its former bulk, it would, I fear, scarce suffice for preserving it from mortification; because it would be the same thing as letting off nine parts in ten of a man's blood in venesection: then if we take in the consideration of the work of digestion to be carry'd on, we encrease our demand to a prodigious degree, without provision for answering it, and the consequence of that requires no great *calculus* to discover. Whence then must the stomach borrow so large and momentaneous a supply without robbing other parts, but from its neighbor the spleen? with which all its vessels are so freely annex'd, which is ever full, which by contraction of its muscles can squeeze it out in any requisite proportion, which by its veins and arteries, *viz.* the splenic, can temper it to any desired heat, and which can admit it back again, and all this without any the least disturbance or interruption, of the œconomy of the other parts, of the circulation of the mass in the whole. I do not think it sufficient to say that the great artery is ready to supply it, and whence should it have its blood but from whence all the rest of the body? for if you stop the chief current that supplies the lower part of the body, you destroy the *major* part whilst you are providing for the whole, and all the time a man is at his dinner, his legs and thighs beside all the lower *viscera* would be benumb'd, or in a dead palsy; or if not quite so bad, yet we certainly should frequently find some inconvenience of that sort, which is quite contrary to all experience. Nor can I imagine any other fund for the stomach but the spleen, and without it, would it not at least plunder from the *pancreas*, from the liver, from the *omentum*, from the guts, even the whole tract of them, from the *pylorus* to the *colon*? which would be ill able to bear such a loss, when it's their business next, and their no mean function, to receive the subtilis'd current of the chyle, separate its still purer parts, transmit it into the blood by their peristaltic motion, furnish the expence and just tribute of lymphatic juices, necessary to carry on the whole *apparatus*, for which the contents of the *abdomen* are chiefly destin'd? It would not have been an adequate method to answer the assigned duty of this concocting organ, had the blood been thrown in upon it directly by proper arteries as in other parts, whereby it would have been oblig'd to take in just so much, neither more or less: or granting it were so, upon depletion thereof, that quantity would be too much and prove offensive to it; or at least such a procedure would have created a tumult in the circulation, or in the adjacent parts, which must have been of ill consequence frequently, if not always, and incommode the distribution of the chyle. But wisely has our Author contriv'd that by the splenics drawn across the belly under the stomach, to the open caverns of the spleen there is a wide channel with many subordinate cuts, to supply it in needful proportion only, and according to its exigences. Just as the countrymen practise in deriving water from a river

river into the neighbouring pastures or meadows, by several little trenches or rivulets, whilst the grand stream glides by, without danger of want or overflowing. And in this respect it will appear to any one that intimately considers the thing, that the spleen may be call'd a mesentery to the stomach, and nature's manner in both, in deriving the blood-vessels to the stomach, and to the guts, mostly by channels falling perpendicularly thereon, and by short intervals, is manifestly aiming at the same purpose, and to favour the peristaltic motion in each. The splenic artery then is plainly mesenteric to the stomach, but by how much more excellent is the stomach beyond the rest of the intestines, by so much more careful has the Divine Artificer been, in placing at the end of this canal the noble composition of the spleen, to conduct that blood by a new direction, and different from the pulse of the heart, so that it may be only and most effectually useful to the concocting part it is design'd for. Nature's care likewise is not unworthy of remark, in preserving these splenic vessels from any danger of accidental obstructions. For they are not only singular in their horizontal situation, but by the support they receive from all the circumjacent parts; being carry'd their whole length upon the *duodenum*, the *pancreas*, the *colon*, and both membranes of the *omentum*, no otherwise nor less magnificently than is the *alveus* of a *Roman* aqueduct upon arches of stone in a level current, over all inequalities of ground.

One other consideration we must not forget; that whereas upon the extraordinary encrease of bulk in the stomach, its fibres and the coats of its vessels, as we said, must become weaker and not so able even to protrude the blood contain'd in their cavities for want of due elasticity, therefore as the spleen supplies 'em with blood, is it not likely that its arterial cells and fibrous columns, which apparently have no use as to its self, obstericate as it were to the stomach, by throwing the blood in, and deriving it back again by its proper power and mechanism, as a sort of deputy to the heart it self? so that it may with some reason be esteem'd as a heart to the stomach: which conception is not unworthy of examination.

I will add one particular more, of which a hint is already given, arising from the great heat necessary, and as we see provided for concoction in the stomach, and from the different state of dimension this part is oblig'd by sudden alterations to sustain, which is this: That it highly became the providence of wise nature, in an affair of so great and daily consequence, that the powerful agent of heat, so useful when well conducted, and confin'd within due limits, and of so ruinous consequence when become tyrannical, should by some contrivance or other be regulated, that is, encreas'd or diminish'd, or retain'd in an uniform force, in the height and proportion this great animal function requires. Like as the chymical registers, which advance or depress the fury of their furnaces at pleasure, from the mild *tepor* of a simple digestion, or the brisker heat of a distillation, to the elevation of volatile salts, or the excessive violence of forcing out acid spirits. Now this I conceive most adequately executed by the spleen two ways, first as we observ'd before in the natural and constant heat, arising from the warmth of all the circumjacent parts, that enclose the stomach, as a fire does the bottom of a kettle, or any thing boyling in *balneo Mariæ*; the spleen closes up the outside of the left and most busy part of the stomach, as the iron door of the hearth in a Still, which by its closeness or remissness can encrease or diminish the heat, that is, by taking in or emptying it self of

the circulating blood, with which it cherishes that side of the stomach, as by a warm cushion or bag of heated sand apply'd to the part; as likewise by its more or less frequent action of forcing this warm blood into the vessels of the stomach. In the second place, if we reflect upon the quality of the vessels coming to it, that its arteries spring from the *aorta* immediately at its origin from the heart, where the blood is of utmost warmth, and that its vein comes in a very wide stream from the *porta* where the blood is certainly of the least, being at the very last declension of the circulation, even much inferior to that of the *vena cava*, as having been transcolated thro' the whole system of the intestines; here it becomes perfectly possessor of a store of quite opposite degrees of richness and vitality, and therefore becomes capable of mixing, compounding, or tempering this blood for the use of the stomach, to as nice a proportion, as the inscrutable instinct of every part of an animal, which most exactly knows its office, can dictate. Which notion in my opinion lets us into so wonderful a scene of the superior dignity of this part, that we need no longer to suspect the pains and elegance of composition which nature has bestow'd upon it, or throw it away as redundant and impertinent.

BLADDER. There are only two other parts of the body subject naturally to such extremity of dimensions as the stomach, and those are the bladder and womb: and was the first exactly under the same circumstances as the stomach, it would without peradventure equally require such a coadjutor as the spleen. Tho' the stomach may be filled with victuals perhaps in a quarter of an hour, with drink much sooner, yet it can scarce be suppos'd that the bladder can be fill'd in equal time, to any excessive degree. Doubtless it takes up hours, so as to produce great uneasiness. Next, the stomach is liable to be, and frequently is gorg'd with cold water; but the water of the bladder is separated from the blood, and of equal warmth, and therefore of it self will sollicit the blood into the enlarging veins and arteries of the bladder as it gradually stretches out, whilst the cold fluid admitted into the stomach will rather repell it. Lastly, there is a great difference between their capacities: the stomach will certainly hold three times as much as the bladder, its coats are vastly thicker, the number of its vessels exceed it beyond comparison, and consequently demand as much more blood; but above all the great force and muscular action thereof of many hours time, the huge flood of juices requir'd in concoction, set it quite upon a different level, and more illustrate the necessity of such an organ as the spleen for the stomach, whilst the small redundancy of blood wanted in the bladder either for retention or expulsion, may without any manner of ill consequence be drawn from, or return'd into the circumjacent parts. And 'tis plain that the warmth of the urin in the bladder, answers every difficulty that may be suspected in the case, from the horror we frequently find after making water, which shows there is a diminution of heat in the parts thereabouts upon that evacuation.

WOMB. Now as to the matter of the womb in females, it serves very much to confirm the doctrine we have advanc'd, and there is a good deal of similarity in the case, and parallel mechanism, tho' with the same beautiful variety, that different parts and uses require, and that nature everywhere observes. The womb is a hollow part, design'd for the reception of the impregnated egg and its contents, which is to encrease in bulk, in proportion to the growing *fœtus*, till the time of birth. It's compos'd of fibrous expansions

expansions and complications of blood-vessels, very like the spleen. *De le Boe Sylvius* compares the substance of the spleen to the *placenta uterina*, whose composition is the very same as that of the womb. *Wepfer* in his epistle to *Tho. Bartholin*, Cent. iv. Epist. 14. compares it to the *placenta*, and to the womb of a woman when near delivery. He says when the juices are squeez'd out of it, it contracts: and that I experimented most evidently my self, in the man's spleen last dissected in this place. He adds, that when put into water it swells exactly like a sponge, pursuant to those notions I endeavor'd to establish in the beginning. *Malpighi* says, by blowing you may stretch it out *in excedentem magnitudinem*: so *De Graaf* declares the womb in time of gestation to be of a spongy substance. *Malpighi* describes its carnos fibres gather'd into bundles, and stretch'd out netwise outwardly, and that its inward substance is a congeries and complication of columns, so that taking away the *chorion* and *placenta* it appears plainly muscular, which changing the scene will pass for a description of the spleen. *Morgagni* confirms it from his own observations, *Adversar. Anat.* iv. p. 47. *Rosset.* c. 1. says it is full of cells after the manner of a sponge or pumice stone, and that nature has given this sort of substance to the womb, that it may contain a store of blood and spirits for the aliment and life of the *fetus*, and administer to the fungous flesh of the secundine, sticking upon the womb as plants imbibe the dew. Now it appears how necessarily this body the womb as it increases in magnitude, must encrease likewise in thickness and strength, not only to resist the struglings of the child, which grow more and more violent with its age, but likewise that it may enjoy a greater warmth to ripen the conception: and this can only be done by admitting a larger quantity of blood. And we see in effect it grows thicker as more extended, and from the innumerable *plexus's* of veins and arteries twisted all over its outer surface, and pervading intirely its inner substance, by degrees imbibes a very large portion of blood for the purpose aforesaid, and for the nutrition of the young one in its cavity. So that the ordinary quantity afore voided at proper intervals by the sex, is now retain'd. But when the end of all this preparation is accomplish'd upon delivery, and exclusion of the *fetus*; the *uterus* discharges its substance of this accumulated blood, by what we call the *lochia*, and returns with surprizing expedition to its pristin crassitude, which *Riolan Anthropogr.* vi. 2. says he has known done in twenty four hours, tho' at this time *Rossetus* says it is two fingers breadth thick in substance. So that we see the womb has the self-same power of receiving into its body a great superfluity of blood, and to encrease its own bulk, not for its self, but for the sake of the little guest it has taken in, just as the spleen, not for it self but for its neighbor the stomach: then when the womb has parted with the offspring, it voids all the unnecessary quantity, not into the mass of blood, for that would bring immediate ruin; but throws it out, and no doubt by the very same mechanic faculty, as the spleen throws the blood upon the stomach, and receives it back again, that it should not offend the whole œconomy. So that the womb is a spleen to it self, and by its texture provides the matter of nutriment to the *fetus* and secundine, of discharge to the *lochia* and ordinary *menstrua*, as the spleen does to the stomach. And this whole comparison if thoroughly weigh'd has so surprizing an analogy, that we can scarce forbear a hymn to sagacious nature, who thus, by what intimations we know not, instructs every member of a living creature in its respective function;

function; but more especially those that serve involuntary actions, which in my opinion are much the same as what we call Instinct in other creatures or brutes. Nor need we wonder more at the nest of a swallow, the honeycomb of a bee, the providence of an ant, or the sagacity of a hound, than at this present business of digestion, or propagation and preservation of the species, at the power of action in the stomach, in the spleen or womb. Every part knows its duty, when to receive, when to give: and it would be to our honor could we say, the actions that depend on our own free will and voluntary determination, are perform'd with as great regularity, as these perpetually done, our selves inscious and unconfenting.

The spleen then, in my thoughts, and womb perform a like task in two great operations of human life, the preservation of the *individuum*, and propagation of our like. The only material difference between the parts compar'd, is in the time and the out-lets whence the blood retires. In the one the encrease of strength and additional access of blood is by very gentle degrees, as the *plethora* of the menstrual blood is heap'd up during the space of some months: but in the business of digestion, it must be almost instantaneous. We may well suppose a voracious man in a quarter of an hour shall stretch out his stomach to ten times or more the space it took up before, and consequently requires as much more blood in the same, or a much larger *ratio*, for the necessary nutrition of the part, and conservation of its natural warmth and life. But cast into the account, the important action it is going upon, and the great strength necessary thereto, we may reasonably conclude, nature had not acted up to her wonted wisdom, had she been forgetful of providing a large resourse of blood upon so notorious an occasion, which we suppose and require to be no other than the spleen.

BEASTS of
PREY.

This method of reasoning appears confirm'd from the consideration of ravenous creatures and beasts of prey. These are endow'd with a capacity of bearing hunger for a great while, because their food is not always at hand, in which circumstance their stomachs are exceedingly contracted, and the vessels thereof empty of blood. When they meet with a spoil, they gorge themselves to a prodigious degree, laying up as it were a portable magazine for the exigences of life, during several days to come. Such are dogs, wolves, foxes, lions, &c. and great fishes, as pikes, sharks, whales and the like, which ordinarily will devour another fish, nearly as big as themselves, which they digest by degrees like the melting down a long piece of metal, by approaching it nearer and nearer the furnace. Now we find in fact they are accordingly provided with large spleens, and with extraordinary communications therefrom, to enable them during the long time of digestion, to receive all necessary supplies of blood from thence, for this extraordinary occasion, which lasts several days before the stomach is quite empty'd again. Thus in the creatures dissected by the royal academy at *Paris*, the lion's spleen was pronounc'd large, and in the lyones they take notice, that the communicating vessels between the stomach and spleen were large, and no less than eight in number. So they tell us the spleen of the castor or beaver was fastned to the stomach by eight short veins, and as many arteries: So the spleen of a civet cat was extraordinary long; *Blasius* adds, very large and totally involv'd by the *omentum*. In the porcupine it's generally very large, and sometime double. In a hedgehog there are no less than twelve vessels, which fasten it to the stomach,

stomach, and *Blasius* himself observes it very large. In the eagle these veins and arteries are remark'd to be very large and wide. And I suppose comparative anatomists will find multitudes of like instances in such creatures, when they shall make it a head of their enquiry. In the dogs I have dissected, and as drawn in Scheme VI. five or six vessels go directly from the spleen to the stomach, veins and arteries, which are so many *vasa brevia*. What is the purpose of all this, but for a more free derivation of heat and blood, during digestion, from the spleen which wants it not, to the stomach where it's so evidently requisite? Again, that no sort of proof even negative may be wanting, it seems that vipers and such sort of animals as have none or rather very small spleens digest very slowly for that reason, and will bear hunger extremely, for *Redi* has kept 'em ten months without eating. In this view probably nature gave them the poison that kills their prey instantly, which otherwise would be very troublesom when swallow'd alive.

It seems to me a necessary supposition, that unless nature had contriv'd the fibrous and muscular fabric of the spleen, to assist the stomach in the above deliver'd method, she must not have form'd the stomach of a plain parcel of membranous coats, but of innumerable muscular weavings and tendinous expansions, like the spleen, or like the body of the womb in females, or wholly like the gizzard of fowls. But then what inconveniencies would have ensu'd from its daily use and sudden alteration of its figure, (if it could have answer'd the use at all) are obvious enough. Its necessary enlargements and contractions would have taken up some days space. A meal would have been a week's work at least. Many other purposes which we shall mention, it would have been utterly incapable of performing, at all; many other not without as great inconvenience as we find in the miscarriages of women. And how often should we be troubled with all their swoonings, fainting fits and sickness, which they undergo upon a first impregnation? This notion would open to me a new scene to be tedious, but if consider'd by those that understand the reasons of these things, from the mechanism of parts and knowledge of the animal œconomy, will of it self spare the audience and me. And we may safely affirm the fabric of the stomach at present, is the effect of infinite wisdom; and that where the blood is to be convey'd to it, not in the common tenor of circulation, but with certain regulation, the spleen is with equal art provided, and nothing else of whatever composition can possibly so well execute its office.

But we must not forget another difference in relation to the comparison we made between the spleen and womb, that is, in the outlets whence the blood retires from each, upon their respective occasions, well adapted to the times requir'd therein. The womb discharges it self of its redundant blood in the *menstrua* and the *lochia*, thro' the innumerable gapings of its *arteriolæ* in its inward tunicle, by the natural contraction of its component fibrous texture: but the spleen pours forth its blood not with an intent utterly to exclude it, but receive it again when equal necessity requires it, therefore it sends it out by the same way it enter'd, *viz.* by the arteries or the veins, as is most requisite, the one going chiefly to the stomach, the other to the liver, and both forwarding digestion and extrusion of the aliment, according to our general assumption.

The continuance of the action of the stomach in digestion, which generally and ordinarily in men lasts four or five hours at least, must require a continuation of all the advantages of blood, heat and spirits, as all other

FLUID SECRETION.

M

muscular

muscular motions do, and to perfect it we must admit of a copious flux of juices, secerned from the inner coat, from the purest blood, before it has parted with any other secretion. For we know the most fluid secretions are perform'd nearest the heart, where the tide runs strongest. This is both to help the dissolution of the aliment and to lubricate the sides of the ventricle it self, to prevent its fretting and wearing away, by continual rubbing, as we see is the practice of artificers, in oyling their hones and whetstones. This can never be done without a perpetual access and recess of a large quantity of fresh blood, warm streaming from the heart, by a short journey, in the manner we have been contending for. This is confirm'd and illustrated by the reasons and experiments made by *Drelincourt sen.* as we are told by his son, p. 31. *de lienosis*; where he proved, that the arteries contain'd ten times more lymph than the veins, that the blood being deriv'd to the spleen in a tenfold greater proportion than into the liver, because the splenic artery is ten times larger than the epatic, must have in it ten times more lymph than the liver. All this is perfectly consonant to nature, seeing she has insert'd ten times more lymphatics, at least considerably more, into the spleen, than into any other *viscus* in proportion to its bulk. If then only the ordinary method of circulation was here observed, and that the blood injected by the arteries to the coats of the stomach, was to pass away by the veins as commonly in other parts: beside the many inconveniences before mention'd, of the times of its return being too long, to give any tolerable warmth to the part; of the obstruction of all its channels by the sudden rising of the dimensions of the stomach, and the like; we may well affirm, that its glandular secretions would presently be exhausted and depauperate, and in short the mighty *focus* necessary would languish and be extinct, and the whole cookery come to nothing: without the dispensation of the spleen, which is, as we hinted, a second heart, or more properly a heart to the stomach. From its similar fabric must we not conclude its use similar? if the fibrous columns in the ventricles of the heart, contract and dilate to force the whole mass of blood thro' the whole body, why may not the like fibrous columns in the spleen possess the same action, to throw the blood upon the digestive organs, whose work is as necessary to the *individuum* as the other?

LYMPH.

It seems plain to me in the sense I have been endeavoring to elucidate even to tautology, that the spleen operates against the force of the heart, and the oscillation of the arteries. 'Tis as it were a pump or syringe, which thus opposing it self, causes a double quantity of blood to be thrown into the stomach. We may suppose it like a secondary engine, at one pulse borrowing its *quantum* of blood and at the next returning it: which must certainly produce upon all the parts bordering on the splenic veins and arteries the manifold benefits desir'd. Must not the blood be squeez'd with great violence into the vessels of the stomach, and forc'd to deposit its fluid part like pressing any thing thro' a sieve? beside, must not this frequent ap-pulse of new blood accelerate the separation of lymph, whose ducts we observ'd to be so very plentiful in the spleen, more than in other parts, and this must be ready to attend the chyle, when perfected in the stomach, and conduct it into the blood, which office the spleen claims in a more eminent degree than any other *viscus*? Further, upon every natural contraction of the spleen, as the blood in the splenic artery is protruded upon the stomach; so that in the vein is forc'd towards the liver, and this latter is equally necessary with the former: for whilst the stomach is concocting the food,

the

the liver is to prepare its contribution of the bile, ready to accompany its BILE. passage thro' the *pylorus*, to stimulate the guts, to volatilise and embalm the chyle, to do what nature has design'd as its business and purpose, which at present is not ours to enquire, seeing on all hands anatomists agree upon its necessary admission into the chyle passing into the blood thro' the lacteals. What is said of the lymph and bile is equally applicable to the fluid secretion of the *pancreas*, and the whole furniture of lymph in the mesenteric glands, and upon all these accounts then the spleen is useful in digestion.

This new power attributed to the spleen in so extensive a manner, as I POWER. have ventur'd to assert, ought not to seem strange, from a consideration of its make, as largely describ'd above, and from the magnitude of the splenic artery. I would ask why has Nature given a bigger artery to the spleen than the liver, which in weight and bulk so prodigiously exceeds it? and that the spleen seems to have a pulse of its own, separately from the heart, is not improbable, from the prodigious palpitation of the coeliac artery in hypocondriacs, no doubt most frequently taken for a palpitation of the heart, and which as is observ'd by *Fernelius* and *Mercatus* does not seem to depend upon the pulse at all, but will in time oblige the heart to sympathize with it. Of which *Tulpius* gives us an example. That the action of the spleen is muscular, is confirm'd from its coats becoming cartilaginous: thus the heart in some has been so tough that fire would not consume it, as that of *Germanicus* found after the funeral pile. And thus *Riolan* has observ'd it. For what purpose are the *ovaria* of females of a like structure with the spleen, as we hinted §. VIII. but to thrust out and expell the egg when impregnated? *Malpighi* himself in the *phil. trans.* n^o 71. p. 2150. calls the spleen in express terms a muscle, which I will repeat MUSEU- LAR. in his own words to strengthen my notions by so great an authority. "*Lienis* "*fibras quæ tot ingenia torsere, nequaquam nerveas sed carneas esse depre-* "*hendi, ita ut ex carneo exteriori involucro & productis transversaliter fi-* "*bris mirabilis fiat musculus, Lienis cellulas comprimens, quo sanguis per* "*splenicum ramum propellatur, non absimili structura & ritu, qualis in* "*grandioribus cordis auriculis observatur. Carnei enim lacerti per trans-* "*versum ducti suarum fibrarum implicatione rete efformant, membraneas cel-* "*lulas comprimens suisque extremis finibus mirabiliter productis, car-* "*neum involucrum constituunt.* After so express an account of its being a muscle as it were to squeeze the blood out, is it to be doubted that during its state of relaxation it must admit it into its cavity, and where must it squeeze it to but to the stomach and the liver, as above recited? Then where is the difficulty of finding out its use? must we not proceed the same way in this and in other parts, and determin the reason of their action and purport, by the manner of their fabric, and the result of its natural consequences?

Has not nature, in as fair characters as possible, pointed out this use; by the nerves of the splenic *plexus* retorted upon the stomach, furnish'd from a quite different nerve, and this in a much larger share, than she has allow'd any where else? why this contrivance, but that immediately upon the action of the stomach, the spleen is rous'd up to its office? The kindred spirits, like *præcursores* or spies and intelligences, excite its mechanism of contraction and relaxation, in order to assist in digestion: by its warmth and by its quantity of new blood, by its plenty of fluid secretion into the cavity of the stomach, by its exciting the liver and *pancreas* to action and perhaps all the guts, by its plenty of lymph to mingle with the chyle. And when digestion is over by receiving the superabundant blood retiring from the stomach

mach with equal pace as its *superficies* contracts, or by gradually protruding more than it can contain, into the numerous vessels of the *porta*, or into the coeliac artery, where it's taken in with the current of the circulation: where it is wanted, or where there is least opposition, that there may be no apprehension of bursting any vessels, or that any member or *viscus* should be oppress'd, the spleen executing the office of dispenser, the *viscerum æconomus* of *Hipp.* to the animal family, thro'out this whole operation.

AUTHORS.

As *Malpighi* in the before recited quotation so expressly establishes the muscular faculty of the spleen, so many Anatomists could not but give a glance towards its uses contended for. The great *Vesalius*, from inspection of its vessels and their connexions, was aware of the service it performs to the stomach, by imparting a considerable heat thereto. "*Lienem*, says he, *suo calore innato ac frequentibus quæ illum intertexunt arteriis ventriculi concoctionem favere.* *Higmore* perfectly agrees to it. And *Pecquet*, who adds, that it is a sort of æstuary to the blood about the stomach and liver, a retiring place. *Riolan* thus delivers himself, "*Ventriculus enim membranofus calido sanguine irrigandus erat, ad conservandum illius temperamentum, quod frigidioris cibo & potu infringi ac debilitari poterat.* And the terrible effects produc'd herein by eating ice and snow-liquors are notorious in hot countries. *Hildanus cent. iv. obs. 38.* gives a case of sudden drinking a large quantity of cold water, which brought the utmost torment upon the stomach, by swelling it out immoderately on a sudden, and from the cold impression upon its coats repelling the access of blood, as we may with much probability imagine, so that the patient became phrenitic for a while with violence of the pain. *Bartholin* says that in some the *vas breve* is wanting, and these subjects probably concoct worse, or this defect is compensated by other arteries. *Carolus Piso*, well advised of this intercourse between the stomach and spleen, thought the gastric vessels, the *epiploic* and *vas breve* carry'd the chyle to the spleen. *Rondeletius* and his followers, *Ulmus*, *Piso*, *Parisanus*, fancy the spleen separates the flower and finest part of the blood as a sieve. Many others have a conceit somewhat like it, as to make a fine tincture by mixing with the animal spirits, such as *Hogeland*, *Lambert Velthus*. *Corn. Consentin. Hyper. Fr. Sylvius* and *Burnet*. In a larger sense taking in the whole distribution of the aliment, we may understand *Monf. de la Chambre* in his tractate of digestion, who delivers it as his opinion, that the spleen makes the spirits for the use of the *abdomen*. *Dionis* says, the continual beating of the fibres of the spleen supplies the want of the impulse of the heart and the spring of the arteries, which alters and prepares the blood, and that the nerves put in motion the fibres to grind the blood, like so many millstones, so that it attenuates and refines it. And this seems to be the reason why the spleen in most birds is very small, §. iii. 2. and an argument that it relates to the stomach, because their muscular gizzard in great measure supplies its use. *Mayow's* opinion quadrates with ours, only putting blood instead of his favorite nitro-aereous particles, "which in due plenty and with a certain *regimen* are carry'd to the bowels dedicate to the concoction of the aliment. So *Descartes* demands a great heat in concoction, and supposes it deriv'd from the arterial blood, which no one can deny to be the fountain of all animal heat. Apposite to the mind of *Plato*, "the warmth of the bowels arises from the blood as from a living fountain of fire: (taken from *Hipp.*) which is the universal mover and only workman of all the functions. As among the chymists *Vulcan* is the only cause of all their operations. *Aristot. de part. animal.*

iii. 7. says sanguineous creatures have a liver, but not all a spleen, but those which have it doubtless for an assistant of concoction.

It would be very unintelligible to me, how it's possible even in mankind, in the ordinary state of life and health, and where we have our regular meals provided, that the stomach should be able to perform so mighty a task, without a vast addition of blood; but much more so in diseases and accidents, especially in the creatures of prey abovementioned. But in reflecting upon what has been said, we may imagine how the spleen forwards digestion, without any fancy'd acid juice, convey'd thence into the stomach. This opinion had gain'd great ground, and as in other cases, when prepossess'd many have conceived such a taste in the blood of the part, but rightly rejected by *Higmore*; and *Drelincourt* p. 28. *de lienosis*. The curious *Glisson* denies this fact, and asserts that the blood in it, (both human and of brutes) is of the same taste and sweetness as in any other part; so that those prescriptions must be vain, where an ox's spleen is order'd to be eaten to lessen the spleen, and attenuate its *atra bilis* by its acidity, as *Quercetan* says, for which reason they have given it to women to force the *menstrua*. *Fonseca* p. 190. Hence likewise we may be able to solve several appearances; as first, what is the reason that after long fasting, if we eat plentifully, the stomach will certainly throw the food up again, if no worse symptoms ensue? because the mass of blood depauperated with nutrition of the parts, can't afford quantity enough to assist the action of the stomach, and because the magazine of the spleen is exhausted. Why such animals as have their spleens cut out, are more voracious than others? because the quantity of their circulating blood is larger in proportion than usual, by all that should be contain'd in the spleen. For this receptacle being absent, the blood lies upon all the neighboring vessels of the stomach in vast plenty, in order to supply the want of the part; so that they are exceedingly dilated and oppress'd, (which we shall touch upon hereafter) therefore by their weight on the stomach the blood will be forc'd to part with a great deal of its fluid parts, thro' the glands of the inner tunicle, which become the stimulating juices for appetite; these saline, poignant, and active secretions, as we said before, being more profusely deriv'd in this part so near the heart and fountain of its circulation; tho' languishing in digestion, the force and store of the spleen not concurring. The muscular membranes too of the stomach will in fasting be made stronger and desirous of action, but then the stomach being fill'd, is not able to perform the work it has provided for its self, being depriv'd of its assistant. *Hildan Cent. vi. obs. 74.* observes in a dissection (the spleen being very sound) the splenic vein excessively large, whence he solves the unreasonable appetite of the patient, yet her food did not digest, and she dy'd of a consumption. Hence likewise dogs that have undergone this experiment are observ'd frequently to vomit up their food, and more especially for several days immediately after, the creatures are wonderfully troubled with belchings, and four discharges of water, the unnecessary ferments of the stomach, which shows how quickly the want of it is felt in digestion; and because it is incompleat, and the chyle not to be pass'd into the guts, nor carry'd downwards by way of a lientery, nature disburthens herself of the superfluous load upwards; and when the stomach is again empty, the former appetite presently returns from the assigned cause. Pertinent to this I have heard *Dr. Mead* relate a story, that when he was a student at *Leyden*, he decoy'd a dog, by offering him victuals in order to dissect him, and found his stomach so prodigiously full of indigested and stinking food,

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that he could scarce open him without cutting into it unawares, and never met with the like appearance before, whence he wonder'd the dog should be tempted with food. When he more curiously examined into the matter he found the dog had undergone an operation before, and lost his spleen by the hands of some of the academics. All this appears necessary and accountable from what is rehears'd. Hence we must conclude, that in the natural order of things, the stomach is neither overpower'd with streams of blood to suffocate its action, or cause inflammation; nor yet in any state contracted or relaxed, acting or at rest, full or empty, is destitute of its due quantity, the spleen by the poize of its muscular fibres conforming it self exactly to exigencies. And if it should chance that from the action and friction of digestion any detriment should accrue to the stomach, as that any artery should be obstructed, the spleen alone seems capable of remedying it, both by its natural force in opening it directly, or by collateral branches carrying on the common work, till it is remov'd, and the free communication restor'd.

SECT. XIV. From what has been deliver'd, we must by this time understand one principal purport of the spleen, at least what I have imagin'd as such, and humbly submit to the consideration of the learned. But if the functions of this *viscus* be rightly stated above, or but nearly so, there are many other collateral uses that may be suggested, for nature seldom fails of solving many intentions by one act. I cannot excuse my self from pointing out some more considerations of this sort, in the same loose way as the preceding, and they seem to confirm what is advanc'd, however, will furnish us with new matter of contemplation; and even tautology must be excus'd in a new subject, where we are not aware of the doctrine design'd to be inculcated.

CONTORTED ARTERY.

The excellence of the spleen arising from its fabric, will admit of further dilucidation. We observed in our description of the splenic artery, that all writers in anatomy wonder much at its vast bulk, beyond any apparent necessity in proportion to the part it goes to. The splenic artery is as big as one of the iliacs, therefore it can receive as much blood upon calculation, as a sixth part of the whole body. *Wedel. machin. vit. c. 2.* and *mæbius fundam. Med.* say it is five or six times bigger: *Drelincourt sen.* measur'd the splenic artery ten times bigger than that of the liver, *de lienos. p. 10.* *Hipp.* calls it *amplissima*: and *Avicen. iii. fen. 15. tract. 1. c. 2.* and *Aponens. differ. 31.* Nor is it most capacious only but most long. *Riolan* says, *multis sinibus tanquam nodis turgidulis intercepta, mole sua venam splenicam æquare videtur sed propter viarum ambages longior existit.* Moreover this artery and its subdivisions near the spleen, are contorted much, like the arteries upon the body of the *uterus*. We know well the reason of the one, that they may be capable of extending themselves upon the rise of the womb, otherwise they would be broke, and they contract with it again proportionally by shortning their lengths. By parity of argument we conclude the same of the splenic artery, and that it is to be relax'd and contracted, that it may conform it self to the intumescences of the stomach, and of the spleen. The splenic artery ending immediately in the spleen, and by its network of ramifications composing intirely the substance thereof, except its muscular fibres; the whole body of the spleen by this means becomes as it were a great artery, or arterial cistern. Considering its muscles too, it has a muscular as well as arterial force. Whence I suspect some late and very learned authors have considered one use of the spleen generally agreed to, but by halves, *viz.* that because the sum of the cells

cells in the spleen must vastly exceed the diameter of the splenic vessels; the blood must fall as it were into a dead pool in the spleen, and consequently move I know not how many thousand times slower here, than in common circulation: and this is in order for the separation of the bile in the liver. It seems to me hard to conceive, that ever blood brought into this condition should recover any commerce with the mass again, any more than that which has stood an hour in a poringer after venæsection; and was it true, we should call it a bungling procedure in nature. This would have some foundation indeed, were the spleen a *parenchyma* only, as fancy'd by *Erasistratus*, *Aphrodiseus*, *Lactantius*, *Oribasius*, *Septalius*, &c. But is not this conclusion of theirs without foundation? the whole body of the spleen is no other than a real artery, has all the ways and properties of acting as the arteries, relaxes its fibrous coats upon impulse of the circulating blood to receive it, and by its innate power of contraction, to expel it again *qua data porta*. Is it not the property of arteries to force and conduct the blood from a larger diameter to a less, because their tubes are conical? does not the spleen the same, from their own supposition? But they did not consider this power of the spleen; and certainly had it no reality, the blood once admitted into it must eternally there remain. Most of our authors since the ancients, surpriz'd at the bulk of the splenic vessels, agree nature's purpose thereby is with a deluge of pure and warm blood to concoct the crudities and superfluous moisture the spleen sucks from the stomach, which most evidently is no other in proper words, than the opinion I have been establishing. And it's plain the *vas breve arteriosum* can have no other arterial power than what it derives from the spleen as its heart. Therefore because the cavities and cells of the spleen are very great, and exceed the diameter of the vessels by which the blood enters, nature has wisely compensated this defect, which would necessarily result therefrom, in the extraordinary gift of muscles. But then it will be ask'd to what purpose did she create a blot or defect, in order to heal it again: this we will consider.

We have already been endeavoring to establish an extensive *idea* of the power of the spleen, we have resembled it even to the heart it self; there is no more reason the blood's motion should be rebated in the spleen, than in its passage thro' the heart, whose ventricles are equally more in diameter than the auricle, than the *vena cava*. Has not the spleen the same *carnei lacerti* as the heart, and why may it not use them? But some will say, how comes it about, that this fine action of the spleen has not been seen all this time? in innumerable dissections, some lucky moment would have presented this noble *viscus* at work, and no longer left us to doubt of its preheminnence, and the manner of its claiming such a style. I answer, that this action of the spleen is not suppos'd a regular and uniform succession of relaxation and contraction; like the pulsation of the heart, such a one is not at all necessary in the spleen. And tho' it may by chance of a sudden either contract, or dilate it self, as in accidents (which we shall speak of by and by); yet was it to be common, it's plain it would deviate far from the office I have assign'd it, of preventing mischiefs in the œconomy, and administering relief upon occasion in divers circumstances. Instead of this good character, it would become a terrible tyrant within us, and have it in its power at any time to destroy us. For so great a quantity of blood as is under its command, either suddenly drawn in, would empty the
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great artery, and drink up its whole channel as *Xerxes* his army, or suddenly gush'd forth, would overwhelm the whole machine, or break its pipes and canals. But no ordinary and common exigences which I suppose the spleen administers to, require this, they are all gradual, not an *impetus*, but like the pressure of a weight, upon which depends the movement of clocks, of a necessary quantity and tenor, tho' their motion invisible. For notwithstanding nature has contriv'd our muscles, as suppose the *biceps* of the arm, to contract it self, or lift up a weight on a sudden, in the twinkling of an eye, upon the impulse of the mind; yet if we please, we can perform that action with any requir'd degree of slowness, so as that its motion shall become plainly imperceptible, and such ordinarily is that of the spleen. And in this very point, the spleen seems justly to be grac'd with an excellence above the heart it self. Certainly the motion of the heart, tho' of the first concernment to us, yet is purely servile and mechanical. It can no more stop or accelerate it of its self, than the globe of the earth in its annual orbit. Such a one as this would not have answer'd the primary intent of the spleen, as is evident above all things. The motion of the heart being perpetually and indispensably necessary without any regards whatsoever; that of the spleen but occasionally, or to be intended or remitted as requisite; and it ought to know when to intend, when to remit, when to contract, when to relax, and in just proportion. Hence therefore may we not answer *Glisson*, who makes it a great question, to what purpose so many nerves sent to the spleen? for as it's observable that the *viscera*, such as the lungs, liver, spleen, stomach, reins and guts, parts vascular or glandular or membranous, have a much larger quantity of nerves bestow'd on them, than even the heart it self, which is purely a fleshy muscle, because their action tho' instinctive, yet is occasional, and not oblig'd by as strict a necessity as the other: So must it be said more eminently of the spleen, than of all the rest, because it has more nerves than any other, even more than the great *viscus* of the liver, so vastly more bulky. The *viscera* are the chief offices of life, therefore most copiously supply'd with nerves; in vain are the muscles and fibres strong, in vain does the heart exercise its ceaseless vibrations, if the cookery of the bowels did not supply 'em with original powers, and means of action. Therefore by this extraordinary commerce between the brain and spleen, are its muscles under a more intimate conduct of the animal spirits, by which it performs the great and beneficent offices I have assign'd it, as the various parts in the animal œconomy under its empire require it. And therefore can it accelerate the blood, as well as retard its motion, when there is occasion. *Heister* expressly says, he has often found the blood in the splenic vein thinner and more fluid, never thicker than other venous blood: and that its arterial is similar with other, no one has question'd. So that tho' I own the blood deriv'd into the caverns of the spleen must lose much of its motion, were there not these muscular fibres, and that it may upon the remission of their action when occasion requires, actually be retarded; yet without the fabric it enjoys, and the manner of action we contend for, it would really have been an useless member, and could not have either assisted the liver in making the bile, or to any other use we or others have or may assign it. If it be necessary a quantity of blood should hereabouts be collected occasionally, it cannot be done any otherwise apparently, but by the present contrivance. For if there had been only a circuit of arteries, as
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long as we please, the blood contained therein must only have gone forwards, and pass'd away by veins, and this but by the common power of the arteries, without any choice, any desired degree of acceleration or retardation, or any determination to particular parts. So that in short we conclude, had not the spleen been just what it is, it had been no spleen at all, and might as well have been absent. But we may say of it as *Rossetus* does of its arteries, "*quas arterias ibi a natura inutiliter repositas qui dicit, medicæ majestatis læsæ reus esto, tract. II.*" Therefore seeing the stomach could not well have acted without the spleen, and that the spleen's action had been well nigh useless without the stomach, we think it prov'd, that the spleen helps concoction in the most eminent degree.

SECT. XV. That these muscles and vessels of the spleen, or properly the spleen it self, in a good state of health, is of an equal and proper tension with those of the rest of the body, is a supposition, which, I think, will readily enough be granted. And as its action of contraction and relaxation is temperate and gradual, it eludes any possible opportunity of seeing it, even in vivisection. But from its described abilities, besides the uses already mention'd, we may suppose it to be a true counterpoise to the whole vascular system, or *compages* of an animal body, an adequate instrument to preserve an *equilibrium* between the veins and arteries, between all the parts of the lower belly, design'd to supply the animal with new food and vigor, and in general between the solids and fluids. This great consideration I shall sketch out in several particulars, not yet or but faintly taken notice of in authors. And for more ready apprehension thereof, compare it to the great reservoirs or basons, which the masters in hydrostatics cause to be made upon a hill, or top of a tower, when they propose to furnish a town, with a constant, equal and regular flux of water. *vide* fig. V. Tab. IV. The reason of it is this: the engine work'd by the power of wind, or horses, or the stream of a river, forcing the water into the pipes, must of necessity break them, when they are full, unless the ends thereof in the city were open, and that it ran out as fast as forc'd in. But this will not answer the use and necessities of the machine. The turn-cocks in the city are open'd as the occasion of families require, and it's the business of the engine to work without any regard to them; therefore the other end of the pipes is carried up to a place of eminence, into a great cistern or pond, into which the superfluity of water ascends. Hence there can be no danger of bursting the pipes, and likewise when the engine ceases to work, as at night is usual, there can be no failure of supply, for the natural gravity of the water brings it down from the cistern, as well as if actually forc'd by the engine. This is just the method of our new-river water-works and other: and that the same contrivance is needful in an animal body, I can scarce think will be deny'd by any person that reflects a little, how necessary it is that a certain proportion must be observ'd, between the canals of the body and the liquids pervading them; between the power of the heart that forces them around, and the resistances every where found in conical tubes, glands, the composition of an animal body; between the progression of the blood, and its return; between the quantity of motion, and the quantity and fluidity of blood, and the like. Therefore to answer all this purpose, wherein chiefly consists what we call a natural constitution or temperature; the heart I conceive represented by the forcing machine, the spleen by the reservoir, and its occasional action is analogous

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to the gravity of the liquid element. As the heart must never cease its action, if we suppose a great stream of chyle encreasing the mass of blood, and at the same time that insensible perspiration, or other secretions be stopt, or that there be any obstructions in the vessels, where will you find a reservoir but the spleen, to prevent a rupture of them, that dilates its cavities for reception of the over ballance?

NUTRITION. This matter may be explain'd in several particulars. I take it for granted that in common way of living, we make more blood than is just necessary for the occasions of life; and without this provision, we should be subject to a thousand inconveniences. The body of an animal, by the curious inquiries of later anatomists, is found to be a vascular system form'd of admirable contexture, of innumerable complications of fibrous and elastic canals, which was observ'd long since by the philosophic emperor *Antoninus*. These are fill'd and permeated by the mass of blood, and the liquors secern'd therefrom: and life and health consists in a well adjusted *equilibrium* and action, between these solids and fluids. The latter being in a continual flux, broken in pieces, forc'd thro' a thousand meanders and secretory vessels, act upon the former, and the action is return'd again, according to one great principle and law of nature. Little parts are perpetually abraded from the sides of the fleshy tubes and solids, which must be repair'd by the addition and apposition of fresh nutritious parts, from the balsam of the blood, the ocean or fountain of the microcosm. Likewise the texture of the blood it self by this expence, as well as constant rotation, equally wants repair, and must be always full and ready to administer to the endless necessities of nature. She would be a very imprudent and improvident mother, or rather stepmother, that was so niggardly, as only to take care of supplies the minute we want it. So complicated a machine, liable to external injuries and internal disorders, must have a reasonable *overplus*, a stock in hand, to be employ'd whenever there is occasion, and for fear a regular supply should be procrastinated. Even ordinary exercise and muscular motion, the great expence of spirits, to vulgarly thinking mortals, much more to men of business and study, the prodigious variety of matter ordain'd for secretions, the large disbursements of insensible perspiration and common breathing, demand a considerable plenitude of juices: and if there was not more than enough, we should be continually fainting. But a violent exercise, or fasting beyond the accustomed time, a *nausea* or want of appetite, a *diarrhea* or excessive sweat, a fit of sickness, tho' but flight, would quite destroy us, and the sides of the vessels would close up: there being no fund to support life under such wants and accidents. And beside, the strength would be so far diminish'd, as that we should never be able to recover upon removing the inconvenience. When a fever was abated, the blood would be wholly impotent, to furnish poor remains for the juices of digestion, the promptuary of the spleen it self would be drain'd. If a bone chanc'd to be broke, or upon an amputation, the fever caus'd by the pain, would have drunk up even the very liquor that supplies the *callus*, or the digesting and healing fluids of a wound. Upon occasion of an hæmorrhage, the main stream would be so exhausted, as to become unable to assimilate new currents of chyle into it self. We may guess at this from the prodigious weakness and sudden dejection that follows an enormous looseness, or the common alvine excretions of hypochondriacs, whose spirits are naturally poor and weak. Therefore this so necessary a surcharge

of blood, I suppose so regulated by the spleen, as that no inconveniences arise from it in the whole mass and its circulation, as the superfluity of water in the before-mention'd hydraulic contrivances. And as it is wasted continually and diminishes in quantity, from the expence of life or accidents, the poize and proportional compression of the spleen, like the gravity of water from the cistern, by pouring from its own cavities, keeps the vessels always full, adapting its force to the exigency of affairs in the animal police.

A great instance of this foresight and provision in nature, we find in the *menstrua* of women. That sex being ordain'd to continue the world, by producing new individuals from their own substance, are so form'd, as that in such a time they shall have constantly stor'd up more blood than is consum'd in their own nourishment, towards that of the child within them; and consequently when not impregnated, must be thrown out by the uterine vessels. According to the true doctrine of one who is now the ornament of our faculty, and this college, in his admirable treatise upon that head. *Emmenolog*. Were it otherwise, they must either eat a very indecent quantity of food, when pregnant, as well as inconvenient to them in that weak state which they generally find themselves in at such times; or must in few months be reduc'd to a perfect *marasmus*, ill calculated for the work then to be done; or else they must perpetually be under as strict a regulation of diet in common life, as if subject to a physical *regimen*. But it may be objected, that this instance is wholly contradicted by the females of other creatures, that have no evacuation of this sort. Nevertheless my corollary from hence is not weakned but confirm'd, by considering the reason of this remarkable difference, and in which above all others, the beautiful order and consummate wisdom of their common and great architect appears. The end of providence, and the social nature of reasonable creatures, that have a freedom of action beyond the impulse of appetites, make it necessary that the sex should, after mature years, be always capable of impregnation, therefore always provided with this redundancy of blood. When they are not impregnate, or in a single state when that purpose is not to be admitted, it must be evacuated, or health is endanger'd. But in the brute part of the creation, where continuation of the kind is only provided for, without any regard to the endearments particular to the human race, it is sufficient that they should admit of the male only in certain intervals of time, when there is this turgescency in the mass of blood heap'd up even in them too; So that it is common to both, but not necessarily evacuated in brutes for that reason. This *plethora* then so requisite, pressing upon the uterine vessels, and swelling them to an immoderate degree, rouses up the spring and elasticity of their arterial coats, and the muscular fabric of the womb, which is permeated by them; so that the superfluity is voided, till there becomes a reasonable *equilibrium* again, between the containing vessels and contained blood. This, as we said before, is done by some such like method as the spleen acts by. We find then the necessity of this redundancy, both for the sake of our own life, and of that we give to others. And truly I am not without just suspicions, that the spleen it self is very useful too in the *menstrua* of women; why otherwise should we commonly observe this *viscus* in a woman exceeds in magnitude a man's, and consequently proportionally biggest of any creature whatever. §. iii. 3. May it not in some measure perform the same office to the womb,

womb; as before we suppos'd it does to the stomach? or at least assist it, which is as it were mainly a spleen to it self by simular texture; or as we said of people laboring under an *elephantiasis* §. iii. 3, 4. seeming to be wholly made up of spleens. And I doubt not but the spleen, was it never to exercise its office, would be of a substance exactly resembling the *uterus* in a virgin. I see no reason why it may not be a receptacle for part at least of the extravagant quantity of blood, and so help to regulate its discharges, as that it may be least obnoxious or inconvenient; that the suddenness thereof or slowness, shall not incommode the œconomy of the parts and vessels, and their mutual actions and relationship. If it was equally dispers'd in the system of the sanguinary tubes, the women would labor for a long space under the terrible symptoms, which are the diagnostics of a suppression of the *menstrua*. The load would weary the elastic vessels to force round so much more than is necessary, and upon quick depletion, so different a state would spoil their tonic powers. *Vasa nimium vacua aut nimium plena sanitati obesse, Hipp. de vict. acut. n. 21. & n. 58. In humano corpore confluxus est unus, conspiratio una & omnia consentientia. Id. de alim.* Certainly in virgins the hypogastrics are very small, and the spleen, as it assists in other cases to preserve the *œquilibria*, so may it probably in this, by taking off part of the burthen from the circulation, and waiting for the critical aperture of those vessels, when it knows how to discharge it self, and perfect the work the others have begun, to its due size and quantity, so as to give time for the mouths of the vessels to close, in the inner tunic of the womb, whence doubtless the issue is made, as *Morgagni* well observes *advers. anat. i. p. 39.* Tho' without question a *plethora* is the material cause of the *catamenia*, yet there seems to be somewhat more, a *divinum quid* in nature as an efficient cause, which we may conclude from the exactness of their returns, as in many diseases; and that in violent fevers, or hæmorrhages, or consumptions, this discharge shall not forget its seasons; and possibly there may likewise be something like a habit in time, such as we get in many external actions. Whence the spleen probably is ready in common and ordinary course of life, regularly to throw its *quantum* of blood upon the stomach, at a certain time of the day it has been accusom'd to, whether a meal be prepar'd or no. And is not this the cause of hunger, which has been matter of so much dispute? *v. Hipp. de rat. vict. in acut. n. 15.*

HUNGER.

IMPREG-
NATION.

If this intercourse between the womb and spleen be admitted, we may easily guess at the services the latter is able to perform upon impregnation, when the *menstrua* must be retain'd. The vast sicknesses and disorders the sex feels upon that account, the vomits, cholics, &c. as they may in great measure be attributed to this retention; so probably they would be much worse but for the cavity in the spleen, which receives a great share of the superfluity, and administers it regularly and calmly to the womb, as its bulk encreasing demands it. Upon such occasions we are forc'd to take away some blood, which only and effectually relieves the patient, and prevents many miscarriages where the uterine vessels are overpower'd. It's great pity women should deny themselves the benefit accruing from venæsection, out of a mistaken notion and fear of losing blood in times of gestation, when it's always safe and necessary in the beginning, because there is commonly a greater quantity provided than expended, till the conception is considerably ripened.

By

By a fimilar method it's obfervable, nature purges her felf in men of a very full habit and lax conftitution, of her *plethora* by the hæmorrhoids, bleeding at nofe, bloody urine, and other irregular ways, and that often by as conftant returns as the periods of women. Whence many gout, rheumatifms, pleurifies, and other rich inflammatory difeafes have been critically difcharg'd, when a ftoppage of infenfible perfpiration, or other folemn fecretions, or too high feeding and intemperance, has enlarg'd the quantity of blood to fuch a degree, that the fpleen finds it neceffary to diminifh it, efpecially by thefe dependent veffels of the *rectum* beft answering thofe of the *uterus*. Juft as thofe that have a member amputated, are obliged much to fhorten their diet, or they become obnoxious to hæmorrhages, dyfenteries and the like from an improporionate quantity of blood. I cannot fuppoſe but that this *viſcus* is of confequence to females, in the terrible efforts of parturition, in adminiftring ſtrength by new blood, in receiving it during thoſe convuſions and ſtruggles, and other means of like nature, where there is ſo great hazard of burſting the veſſels. This will offer an opportunity to ſtart a queſtion, whether or no it bears a part in the organs and actions dedicated to *Venus*, in favor of the opinion of the ancients, in furniſhing blood upon thoſe occaſions to warm and inflate the parts, or ſupplying its want in the adjacent veſſels.

By all the bodies that I have had opportunity to examin, I judge the *corpora cavernoſa* of the *penis* exactly of the ſame manner of fabric with the ſpleen, and the actions of both, their inflations and depletions ſeem perfectly analogous; and that of the internal part cannot be better and more ſenſibly explain'd than by the external. Whoſe power and mode of deriving and retaining ſo ſuddenly and ſo long a quantity of blood and heat to it ſelf, appears as little accounted for, as that which adminiſters the occaſion of this diſcourſe. As for the vulgarly received opinion of the *erectores* or *transverſales* muſcles doing the feat, by hindring the return of the blood, I much ſuſpect it. The contraction of muſcles is voluntary, involuntary or mixt, and I do not apprehend thence, how by any means the blood is forc'd in an extraordinary quantity into the part, ſo as to cauſe erection, nor how they act by compreſſing the outlets thereof as commonly thought. The firſt can do no more than pull the *penis* a little to one ſide, and when acting together, ſhorten it a little to give it a greater tenſion: the latter (diſcover'd by Mr. Cooper) by thoſe that have examin'd the matter thoroughly are ſaid to pull quite the contrary way, and rather open than obſtruct the blood-veſſels; as for the *acceleratores*, they relate only to the *urethra*, in giving an *impetus* to the contents of the bladder, and *veſiculæ ſeminales*. A *plethora* either total or partial is equally the material cauſe of action in both; as in the *penis* is evident when it ſwells after death, particularly in the common execution, hanging, where the weight of the blood preſſes into the part: And after a battle, when the blood has been inflam'd with action, ſo that it takes up more ſpace than before, and produces the ſame conſequence as a *plethora*. This is more eſpecially remark'd in the *Turks*, who upon thoſe occaſions take ſome fine crude *opium*, whoſe genuine effect is to warm and inſpirit the blood, as in drunkenneſs, which is attended with the ſame *phænomenon*. This has been cauſ'd by enclosing a dead corpe in plaſter of *paris*, the cold conſtringing the veſſels, and protruding the blood where leaſt reſiſtance; and I believe any of theſe cauſes as frequently affect the ſpleen as the other part, which

may be the reason we so often find it much swell'd and hard after death, when the person labor'd under no disease thereof. All these show the great conformity between the spleen and *penis*, and the comparison illustrates each other. Nor can we account for the like sollicitation of blood any other-ways, into many other parts which renders them turgid and tense alike, such as the nipples of the breast, the excrescencies on the necks, throats and heads of turkeys, cocks and the like, when they exert themselves, and show their pride as we vulgarly speak. And if the reason of the structure of the *penis* and such parts be, that they should swell and relax, upon this adventitious heat and unaccountable fall of the blood, we must conclude the same of the spleen; and seeing there is a secret and surprizing sympathy between divers parts of the body, especially those of like texture, (as *Baglivi* largely demonstrates, *de fibr. motr.* i. 10. *Morbi partium in substantia & compage similium mutantur ad invicem*, *Baglivi*, p. 306.) we may justly believe the same heat, *plethora* or mantling (to borrow an expression from fermented liquors) in the blood, will cause a similar effect in both these bodies. And as far as we may guess from a thing that has never been consider'd, we find it so by experience, both the parts after a full meal prone to admit the blood; whence a preternatural extension of the spleen becomes a disease as much as a priapism: and that lienose are observ'd to be very falacious, about which *Drelincourt* makes merry, p. 54. *de lienosis*. Sufficient it is at this time, that I only give the hint in these nice matters, and that what is said of the *penis* is as applicable to all the uterine parts in a woman. To examine this matter thro'ly would cut out entirely a new work; for there are yet immense regions in the province of nature uncultivated, and we contentedly run away with vulgar notions and solutions, neglecting to examine into their truth. It seems easy to imagine, that if the spleen be the *moderatrix* of the *equilibrium* between the blood and the solids, it may at any time lend a due portion to the organs of generation, and receive it again. We need not scruple the distance in this or the like cases between the parts, for adding a quantity of fluid into any point of the containing vessels, affects the whole liquor, and presses alike upon every part of the vessel, without immediate contact of one part, as the pulse at the heart is felt in every extremity of the arteries. And this I conceive to be what is meant by the ancients. But one may be naturally induc'd to believe that in mirth, joy, exultation, laughter and the like passions, where *in mente sana & corpore sano*, there is a grateful sensation within one, arising from the brisk emotions of the blood, and vibrations of the solids, like the melodious thrill of a sharp musical string, beyond the calm degree and gentle indolence of health only: In this case I say the spleen must be more affected than any other part, because more largely supply'd with nerves, and therefore administers to all the various and pleasant tumults of the blood, and counterstruggles between it and the fibrils, and the fallies of the spirits. And the same causes should naturally have their influence on this part hid within the recesses of the *abdomen*, as well as on that outwardly posited, and likewise abounding with a large quantity of nerves. *Plato*, *Pliny*, *Galen*, *Aphrodiseus*, *Aurelianus*, and innumerable moderns, make the spleen the organ of laughter. *Splen ridere facit*, says *Isidor.* in *orat.* and *Perseus sat.* i. *sum petulanti splene cachinno*; and the teutonic word *milt*, whence our *english* name is deriv'd, implies mirth and munificence says *Beverwic*. But of this again hereafter.

MIRTH.

We proceed to intimate some more incidental purposes of the spleen. VOMITING.
 We have shown largely before, the singular aid it is suppos'd to exhibit to the stomach in digestion, does it not hold equally true in that violent action, vomiting, whether casual or with design? In such a sudden convulsion of that part, where it changes its dimensions so exceedingly and momentaneously, there must be a voydance of blood in its encompassing vessels prodigiously quick and impetuous. The same will be repeated upon every fit. And how this admission and return of the blood, and the whole action can be done, and without infinitely more ill accidents than commonly, but by the help of the spleen, I see not. *Horstius* has seen a spleen with three blood-vessels going from the mesentery to it, one in the middle, and one at each end. The like may be affirmed of all convulsions of the bowels, hystERIC fits, iliac passion, windy, humorous or nervous cholics; and the gut *colon* seems reflected up to the spleen with that view in COLON. nature; and to have so free a communication with it by blood-vessels and nerves, to be near its sovereign influence, as well as that by its heat it may warm the stomach. For this intestin in retaining and excerning the excrements, is much in a case with the stomach and the food, and seems as much to require the benefit of the spleen in its common function, as upon extraordinary occasions; when pain, or the *stimulus* of a clyster or acrid humors occasion its disorder. Were not its blood-vessels large, and immediately communicating with the splenic, we should be liable to aneurisms, *varices*, *hydatides* in the part: or other disturbances would accrue to the animal oeconomy, every time we went to stool. Therefore is the spleen ty'd to the *colon* by membranes, the nerves of the *colon* are deriv'd from the splenic, and its vessels too. Further, *Riolan* thinks the spleen beneficial to the *colon*, in furnishing it with blood and warmth, as it does to the stomach, if it should chance to want it, especially in such diseases as we have just mention'd, his opinion with a little alteration very much quadrates with ours. Toward the end of his ii. and 23. he says, "*Lien naturale est reconditorium sive promus condus sanguinis (elaborati in hepate, sed potissimum crassi terrestris & melancholici) qui ibi asservatur ad usus necessarios, vel ut attenuatus ex permixtione arteriosi nutriat partes alvine regionis cum altero sanguine venae portae, vel ut refluat in jecur si eo indigerit, atque lien id agit quamdiu isthaec viscera sunt integra & sana, non debet autem ingurgitari & nimium repleti sanguine, alioquin depauperantur & contabescunt partes alvine regionis, totiusque corporis, ut scriptum est ab Hippocrate.*" We may consider here is a direct passage, and nearest communication between the spleen and all the mesenteric vessels, whereby it's allied to the *omentum*, *pancreas*, liver, guts, womb, bladder, &c. so that it seems to regard in this view, and in all the beneficial purposes we before-mention'd in respect of the stomach, all these *viscera* of the *abdomen*. So general is its commerce with the appendages of the mesentery, liver, kidneys, stomach, that *Willis anat. cerebr.* c. 27. rightly observes, the spleen suffers for their indispositions; and it seems truth, that upon a too plentiful ingurgitation of liquor, as in common drunkenness, as well as in excess of eating, the *viscus* we are treating of must charge it self with a very considerable share of the superfluity, for we can scarce otherwise think it possible for such a quantity as some will swallow down at a sitting, to be admitted into the circuit of the sanguineous tubes: and there are, says *Bartholin*, that will indulge their cups for a whole day together, without making water.

Further,

Communica-
tion between
the PORTA
and AORTA.

Further, as the mesenteric vessels, especially the veins running into the *porta*, are a system of themselves, and independent of the great artery and *cava*, having no ready passage into the common mass, but thro' the body of the liver; the spleen is its communication by which in case of an obstruction it may, and does questionless ordinarily make its retreat. So that as before we observ'd, the spleen claims the *species* of a subordinate heart, or a heart to the lower cavity the *abdomen*, as the *meninges* are by very great authors (*Baglivi* and others) thought to be a heart to the supreme cavity the brain.

ACCIDENTS.

If these notions are not entirely chimerical, the general uses of the spleen are so extensive, as it seems obvious to me that life, without it, must be subject to infinite inconveniences, not regarded because thereby prevented. Therefore had we no such organ, nature would have done wisely to have made one, where the foundation of our being depends upon a circulation of liquids in pipes, and a certain harmony in their mutual action upon each other. Suppose we in violent exercise, running, leaping, fighting or the like, unforeseen accidents, a sudden fright, fall or terrible shock, an extraordinary passion of anger or other, the running against a post in the dark, any thing of fear, that necessarily produces a most vehement and universal contraction of the solids; these must throw the whole machine into prodigious jeopardy, and it would be impossible to avoid a rupture of some of the blood-vessels, if there be an exact plenitude, or as we suppose somewhat more, and an hæmorrhage internal or external must ensue. Do not these make fire flash in our eyes as we express it, does not the surprize of falling into the water, or the ordinary going into the cold bath, where the terror is lost, often force the blood thro' the tender vessels of the lungs, cause head-achs from its being more than ordinarily press'd toward the irresistible substance of the brain? *Gaudium & ira menses promovent*, says *Baglivi*, de fibra mot. i. 10. *Uteri laxitas solo terrore sanata fuit*: *Id. eod.* both depending on the tensility and oscillation of the fibres in the part, deriv'd from the passion. Nothing appears capable in these extremities of warding the impending ruin but the spleen. This seems to be the case mention'd in *Kerkringius spicileg. anat.* of a man that dy'd, fifteen months languishing after a fall from a house. When open'd, his spleen was found excessively big and hard, and the author of all the calamities we shall recite when we come to consider its diseases, for here nothing appear'd of any bruise, but probably the too great afflux of blood to the part upon that accident, debilitated its tone to that degree, that it could never recover it. And ordinarily do we not find that in violent passions the left hypochondre will be sensibly inflated, and a strong pulsation felt externally, beside the tensive pain we perceive inwardly? because in such casualties the spleen is as it were a place of arms in open trenches, whereto upon a sally the disorder'd troops repair, unite and return in proper time to their stations and duty with fresh vigor. Its great vessels are ready from all parts to receive a share of the tumultuous mass into its caverns, and prevent dire consequences of extravasations, and when the disorder is over, to remand it back to the vessels. Were there not this provision, scarce any passion of the soul, even laughter it self, but might prove fatal. Commendable therefore is the practice so frequently us'd of venæsection upon sudden and extraordinary joy, as the unexpected reprieve of a criminal from death, good or bad news, and the like. Now in this case too, there is a general contraction of the solids,

as

as is evident from the rushing of the blood to the heart and almost oppressing it, which we sensibly feel, and the violence is exerted chiefly by forcing the blood from a less into a greater space, so that acting upon the capillaries of the arteries, the blood is driven into the widening veins, whence paleness immediately ensues; and upon their wider trunks by consequence it retires into the spleen as their proper *diverticulum*, whose widest arterial capacity absorbs it, and thereby the danger of rupture is prevented, till the laboring heart by degrees recovers its regular motion, and by both the œconomy is restor'd: the heart being a muscular pump, the spleen an arterial one. Under this same predicament in right reason ought a fever in all its degrees to be included. For where the blood is heated, rarify'd and inflam'd to a prodigious degree, 'tis the same thing as if its quantity was extravagantly encreas'd, and the vessels were incapable of containing the whole mass. So in ligatures of any part or obstructions, where the vessels of one member are turgid, in another flaccid, the spleen is the only instrument that can restore or keep up a tolerable *æquilibrium*, taking where redundant, giving where deficient, and procrastinating a fatal interruption of the circulation. It's well worth while to consult the learned *Baglivi*, largely discoursing on the necessity of this *æquilibrium* between the solids and fluids, and of the diseases and inconveniencies arising from the errors thereof, *de fibr. mot.* i. 6. *corollar.* 2. This whole doctrine of ours appears to me highly confirm'd, and to sight demonstrated from the odd structure of a hedgehog, a creature which has so wonderful a faculty of coiling it self into an orb, and repelling an enemy with its palisado'd skin. Here nature has bestow'd a remarkably large spleen, with very numerous vessels, as we mention'd before; to favor this purpose, that the blood being press'd out of the other sanguinary tubes in the limbs, might withdraw it self thither. Thus do the *millipedes* form themselves into the shape of a pill, in hopes to elude the appearance of an animal, and by the eye of reason we may imagine has the same inward conformation of parts. From all which reasons, and above all because of passions, is the human spleen bigger, and more furnish'd with vessels and artifice than bestial, not subject to such sudden inundations and rarefactions. *Riolanus* says, the ape's spleen is exceeding small. It's well nature has so justly and essentially distinguish'd the ape's from ours in shape, bulk and want of connexion to the diaphragm. [§. iii. 3.] *Blasius* p. 109.

It cannot be very absurd, if from likeness of conformation, we should think the spleen and heart have no mean relation, not only as the spleen must receive the vital current from the heart in common with other parts, but as it has the like muscular columns and mode of contraction, whereby it administers great assistance to it in quality of superintendant of the *æquilibrium*. For as we said, it's as necessary that the blood should be proportion'd to the heart, as that the heart should circulate it, and they are reciprocally so. Nature could not be too solicitous to render the work of that great pump of the microcosm as easy as possible and uninterrupted. For which reason she has contriv'd the auricles as a standard measure, to pour in by size a due quantity of blood and no more, at one time into the ventricles. And besides, the spleen with its poize takes care to keep up an exact plenitude in the vessels to further the business of the auricles, and the beating of the heart, and its office must be as incessant. Therefore the spleen may justly claim a title above that of being servant to

the heart, seeing it has a sovereign influence over it, for if it forces much blood from its cavities, it must make the heart beat oftner, to overcome the additional weight. If it usurps more to its self, the labor of that principal muscle becomes less. And in this sense, if any, we may understand *Vesalius* v. 9. *anat.* “*lienis beneficio cor præcipuo quodam usu refrigerari*” “*(quod arabum præcipuis affirmatur;)*” and if we please we may interpret this to be the meaning of younger *Helmont* making it the seat of his *archæus* or sensitive soul. Under the notion of a *diverticulum*, the spleen is taken by Dr. *Lister de humor*, and Dr. *Purcel* on the cholic; to prevent a suffocation of the heart upon a too copious access of blood towards it, agreeable too to the sentiments of a gentleman in the *philos. trans.* n^o. 34. p. 651. “for when (says he) from vehement motion or passion the blood “boils too much, lest it should oppress the heart, and injure the brain by “too furious a fally, the spleen receives a good part thereof, so that its “swelling thereupon with a pulse and intense heat like that of the heart “may outwardly be felt by any one.” *Laurent* vi. *quest.* 27. says there are *anastomoses* between the *porta* and hepatic vein going into the *cava*, and thence solves the voydance of his imaginary melancholic blood of the spleen by the emulcents, and so by urine; but he thinks it a nearer way by the arteries. He repeats it again, iv. *quest.* 8. I need not intimate how by this means the purpose we are insisting on, becomes still of a much larger extent and benefit; for if any tumultuous return of the blood in the *cava* should offend the right auricle, the surplus finds a passage into the spleen by the splenic vein, or if an obstruction happens in the great artery near the heart, the splenic artery brings relief. These circumstances may further

COLD. take place upon great external cold, where the blood cannot return from the extremities, so fast perhaps as wanted at the heart; therefore the uppermost part of the *cava* near the right auricle can borrow (by inverting the proposition) from the spleen thro’ the splenic vein, to supply the heart, and likewise produce a narrower circuit or epicycle thro’ the splenics, till the blood thus more than ordinarily warm’d by so quick a repetition of its passage thro’ the heart, lungs and spleen, will be fitter to expedite the transit of that, near stagnating in the external parts and *anastomoses* of the limbs.

Perhaps I may have been too large and too particular in these indigested hints, but I was willing to offer every consideration, that might occasion these matters to be more enquired into. I shall not regret my labor, if any one of the notions produc’d may be of the least advantage to medicine. What remains of this sort will be but brief, and therefore favors your patience.

USE IV.
LIVER.

SECT. XVI. *Boerhave*, *Keil*, and most of our moderns acquiesce in this opinion, that the spleen has great regard to the liver, and seems made on purpose to assist it, in its work of separating the bile from the blood. *Alexand. Aphrodiseus* §. ii. *probl.* *Aretæus* i. *chron.* the author of a little book *de respiratione*, and most of the antients made the spleen an helpmate to the liver, wherefore they call’d it νοθον ηπαρ και ωσπερ αντιζυγον. *Aristot.* t. i. p. 1005, 1009, 1010. *ed. Paris.* v. *Hoffman’s apolog.* ii. 35. *Hipp.* iv. *de morbis*, thinks when the liver is out of order, the spleen is its substitute. I take all these to be true, but with some qualification. The ancients must be understood to mean the secretion of bile instead of sanguification. The moderns observe, that the splenic vein passing directly to the *porta* in

conjunction with the mesenteric, omental, &c. terminates in the liver, and carries that blood whence the bile is taken by the glands therein. That blood deriv'd from the veins of the guts, call'd mesariac, must be look'd upon as next to stagnant, having the least degree of spirituousity and fluidity, by loss of its liquid parts in the lymphatics, in the common nutriment of the contents of the *abdomen*, and its motion very much rebated in those membranous *viscera*: therefore according to the doctrine of secretion well establish'd by Dr. Keil, extremely favors the separation of so crass a fluid as the bile, which must be slow and leisurely, the union of its viscid particles requiring time to coalesce, and doubtless oily globules of fat from the *omentum* make part of that saponaceous juice. They add further, what we mention'd before, that for fear this should not prove sufficient; here is the blood in the spleen carry'd by the splenic vein, from whose dilated caverns it moves with a yet more sluggish pace, and more despoil'd by its numerous lymphatics. And this use of the spleen we may grant in case it be wanted, and from the theory of the part all along by us advanced, it has it in its power to retard, as well as to accelerate the motion of its contained blood. But still we must beg leave to suspect this is an exigence much seldomer occurring than seems demanded by those gentlemen, and upon which they probably lay too great a stress. For tho' we allow the spleen to be an arterial *cista*, as it were, inclos'd in a venal one, and that from its vast ramifications and cells in its body, the blood contain'd in it would, *ceteris paribus*, find but a difficult passage out; yet if we throw in to the account a consideration of its muscular fibres, the same effect is ordinarily produc'd therein, as if the *anastomoses* of the veins immediately received the blood from every extremity of a capillary artery, therefore is the circulation therein faster or slower in proportion to that of other parts, as use and necessity dictates and requires: and I believe more frequently in life the former, rather than the latter. And in the main may conclude no part of the body has an equal privilege with it, that can with choice take the thin arterial blood, if too much drain'd by the lymphatics, or the thick of the venal, and this in what proportion it pleases, to any required temper; and be that as it will does not impeach our general doctrine, but much confirms and illustrates it, and fully in our opinion exalts the *idea* we have conceiv'd of it. And if we reflect upon this matter seriously, we may well imagine that nature has contriv'd this organ as a heart or pump to the sluggish vessels of the *porta*, which has no other active power belonging to it, and that as the long rope of the *par vagum* nerve is let down thro' the *cranium* for the use of the heart, so the longer of the intercostal is destin'd with still greater strength to the spleen, whose business, tho' not so constant, is as necessary and more various.

I think I have given sufficient testimony, that the blood in the spleen ordinarily is not in so effete a condition, as to be worse than that of the mesariacs, but equal to the most rutilant in the arteries of the body, contrary to the assumption of their *hypothesis*, tho' accidentally and in diseases it's to be thought such is the case. It appears no mean argument against them, that in all epatic obstructions which cause the jaundice, the spleen generally is a fellow-sufferer. In the mean time I am fully persuaded, that it is of utmost concernment to the work of the liver thus. The action of the liver is occasional, as well as that of the stomach, but because it is slow, there is a reservoir provided for it with the very same mechanism as we before asserted

asserted was the case of the spleen; in relation to its becoming the instrument of *equilibrium* between the solids and fluids. This is the gall-bladder which appears a true cistern plac'd at the end of the cystic duct, into which runs the overplus of the bile falling down the hepatic duct or *porus biliaris*, and not immediately admitted into the guts, where there is no occasion for it but after digestion finish'd. Moreover if by any chance the liver is too slow, or is hinder'd in its action, the plenitude of the gall-bladder supplies the necessity, for a meal or two, in which time it's to be hoped nature will be strengthned to subdue the inconvenience. The voidance of the gall-bladder is perfectly analogous to the water flowing by its own gravity into the aqueducts of a city, whilst the forcing engine ceases to work, according to our former comparison. Now all the inconvenience the liver can be liable to, supposing it of good conformation, is the obstruction of the biliary glands, and indeed from the slowness of the blood moving to it, and that of the separation in it, it's not to be wonder'd at, if it happens so often, and causes a jaundice, or retention of biliose particles in the mass of blood. But I guess this would be infinitely more frequent were it not for the spleen, which is regularly an instrument of volatilization to the blood, as in a partial sense has been the opinion of many Authors of good note. *Waldsmidt, Velthuisius tract. de liene. Drelincourt de lienosis, &c.* So *Rossetus* says *Lien sanguinis vitalis est non fons & origo sed vel penurarium vel officina quædam.* v. *Ulnaus de splene. Hipp. de intern. affect.* says, the spleen is always of a hot temperament. Why should young *Helmont* make it the seat of the soul, if he had not observ'd it full of rutilant blood? therefore is it not reasonable to assert, that the spleen is an arterial lake or fluice of brisk and pure blood, to oppose against the poverty and extreme inactivity of that in the mesariac branches of the *porta* going to the liver? for which there seems a spur wanting rather than a curb. And in this sense with *Galen* we may say the spleen is a purger of the liver, with whom *Oribasius* agrees. Nor can I doubt but a little fresh blood added, will promote rather than retard the union of the biliose particles in most constitutions, and for this great purpose nothing could have been better contriv'd than the spleen, its vessels and action as above deliver'd. And doubtless the guts would frequently mortify were it not for the spleen, from whose sovereign office upon occasion it can borrow new vitality, without commonly injuring the slackness of the circulation in themselves so necessary for the liver. Consider further, that the liver keeps holyday sometime, as particularly upon fasting, when nature knows how injurious it would be to pour into the empty guts that terrible *stimulus* of the bile, tho' from the common *plethora* there is no deficiency of blood for such a secretion. I ask then what must become of the stagnant blood in the mesariacs, and how must its motion be quickned to enable it to retire into the mass again, unless the spleen lends its friendly aid? either pours a warm deluge upon it, whence it passes thro' the liver without losing its bile by accelerating its motion beyond that degree necessary thereto, or expedites it thro' the communications between the *cava* and *porta* mention'd by *Laurentius*, or absorbs it into its own capacity and restores it into the arteries; so that in this it becomes mediator between the two distinct systems of blood-vessels, that of the *porta*, and that of the whole mass in the veins and arteries. All this seems very particularly confirm'd by the experiments of *Morgagni, Bobnius, Ortlobius*, and *Malpighi*, that when the spleen is cut out, the bile is observ'd to be

of

of a more obscure color than otherwise, as wanting some briskness and fire from the lienal fund. Indeed, this last method of nature is the very same as is practis'd every day in works of sewers in level countries bordering on the sea, by what they call the back-water, that is, when one of their drains or outfalls wants scouring, they take in a great quantity of the sea-water at a high tide, which upon the recess of the tide, adding a new weight and *impetus* to the fresh water removes the obstacle. This notion of ours in a great measure coincides with that of *Drelincourt sen.* for he, as we before said, observing that the blood in the veins is ten times thicker than in the arteries, and more especially in the *porta* than *cava*, concludes that the fluidity of the arterial blood in the spleen must necessarily promote, by its abundant lymph, the passage of the mesariac blood again to the heart, seeing it has no assistance against its *lentor* by lymphatics deriv'd to the *porta* for that purpose. And thus, according to my apprehension, do we solve this *quare*; why is an hysseric fit or a fever judg'd by a sudden jaundice thrown all over the skin? the spleen forcing the attenuated blood in the mesariac vessels thro' the liver, and hindring its common office.

There are many other collateral uses of the spleen I might insist on, and enquire whether it is not subservient to those that give suck, where a large quantity of blood is necessary, as appears from the retention of the *menfes* at that time, and the brisk appetite of the mother? what relation it has to accidents of respiration, by means of the phrenic branches? what is its intercourse with the *pancreas*? If the office of the *pancreas* be reasonably suppos'd to furnish a smooth juice that may temper the bile, and hinder its too violent bite upon the immediate part of the intestin it falls into, which would become painful; then the *pancreas* rightly receives its blood for so fluid a secretion from the splenic artery or spleen it self. I observ'd in the body here dissected, whose spleen is presented plate vii. some arteries going to the *pancreas* just at their entrance into the spleen, and hence the reason why the mesariac blood comes not to that *viscus*. I might examine whether the *glandulae renales* or separation of urine in the kidneys has respect to the spleen, seeing there have been found communicating branches between it and the emulgents. The ancients ever had a notion of the spleen evacuating it self by the bladder. The *Chameleon* wants a spleen, and equally all its urinary organs, neither drinks nor makes water, digests not its food but voids it unchang'd, having a natural lenteria says *Blasius* from *Panarol*. No wonder then if asserted useful in digestion. These and other enquiries of this nature, I leave to further *examen* by my successors in this chair.

Left the force of the reasoning all this while deliver'd should be thought less'n'd by an objection which will readily occur, somewhat remains to be said upon it. If such be the great use and offices of the spleen, not only *ex eventu necessarium*, as *Aristotle* says iii. *de partibus animalium*; but that it appears in our own account thro' so long a series of particulars, highly and indispensably necessary to the animal œconomy, and even to the very being of creatures; how comes it to pass, that when it's totally extirpated, they live perfectly well, or if they suffer some little inconveniences, yet do not some other advantages accrue, that render its loss less sensible, and perhaps in the main no real detriment? To which I answer: *Rossetus* ii. *de partu cæsareo* p. 154. delivers it as his opinion, that in these cases they cut away but part of the spleen, and that even part of the lungs have been fe-

veral times cut off and heal'd. And indeed in dogs, wherein the experiment has been chiefly establish'd, it seems next to impossibility that the whole should be taken away, from consideration of the blood-vessels that must necessarily perish, to say nothing of the great collection of the nerves there: Its situation appears quite the reverse with a man's, (certainly a much more proper subject in the case,) for the head is posited where the tail of a man's, and the whole more inward, and under the length of the stomach. It's evident from the cut exhibited Tab. vi. that of seven vessels going to the stomach, five at least must be cut away, so that in all reason we should judge the stomach must be strangely defrauded of its nutriment: Nevertheless admitting the experiment in its full force to be matter of fact, (which I fear has wanted due examination) there as yet has been no other benefit pretended to, than rendering the creature more gay, more swift, more voracious, more salacious. All which may without difficulty be solv'd by what we have already shewn, *viz.* that the quantity of blood is thereby increas'd in the whole mass, by the surplusage of that which should ordinarily reside in the cavity of the spleen, or the ballance of the *æquilibrium*. But this pretended benefit is wholly deny'd by several antient and modern physicians, whose authority in this point should weigh more than that of *Pliny*, or some empirics and turkish horse-jockies. And is not want of digestion, scurvy, and other diseases and inconveniences mention'd, more than a sufficient counter-charge against these precarious perquisites? which in the whole can never avail to overthrow so many manifest occasions where its presence and action as establish'd, is highly necessary and commodious at least: much less to prove nature a bungler, and guilty of supererogation, who has display'd all possible marks of profoundest wisdom and design, and yet magnificent parsimony in all her other formations. May we not more reasonably suppose, that where the animal is depriv'd of this *viscus*, after her wonted manner, she contrives a thousand ways to remedy the detriment as well as possible, and tenacious of life forms new vessels, or enlarges others, finds new modes of action for her relief, and delegates the task of the lost part upon others? as *Bartholin* supposes, *cent. iv. hist. 51.* that when the spleen is rescinded, the *pancreas*, liver, or somewhat else becomes its deputy. Thus we see upon cutting a great artery, she expands other collateral ones to supply the circulation, as *Mr. Cooper* tells us in the *phil. trans.* A most eminent instance of this nature in *Brunner's exp. nov. c. pancr. exp. vii.* and in another dog p. 118. and in general he supposes his uses of the *pancreas* transfer'd upon other parts which must act for it when cut out. And in the experiment of *Malpighi* §. xi. 3. and in that before-quoted passage from *Laurentius*, where it was deficient originally §. iii. 2. it seems manifest, the vessels were oblig'd to become succedaneous to the spleen, and being more swell'd out, particularly the artery and its coats thickned, it might well undertake in such emergency the whole business thereof upon its self, and very adequately, since there is so great conformity between them, and their power of contraction and relaxation equal; since as we demonstrated, the spleen seems only a multiply'd or protracted artery with muscular fibres over and above, bestow'd on it for greater strength in imitation of the heart. Here likewise were all the lesser ramifications of the blood-vessels of the stomach more enlarg'd, the better to enable it by heat and blood to perform its digestion, and become its own promptuary or a spleen to it self. That redundant

dundant blood thrown thither for that most evident purpose, forceably distending their coats which should retire into the neighboring cistern. So the huge encrease of the liver shows, it's oblig'd to extend its own province, to contain someway or other that store of blood in its self, which aforetime was treasur'd up in its magazine the spleen. Thus the appearance of the dog dissected by Dr. Mead, the vomiting and all other symptoms enumerated on such experiments, confirm not weaken the produced doctrine. The reason of sour belchings and *flatus's* in these mutilated animals, seem perfectly like that of hypochondriacs, owing to irregular and too hasty fermentations in deprav'd digestion, like water boiling over with too much fire, because the tone of the spleen is spoil'd. Whereby it either pours the blood and digestive juices into the stomach too much, too suddenly and in convulsions as it were, much as is the case where the vessels only officiate when it's cut out; or else not enough, so that it answers well a furnace without a *regulator*. And in our subsequent account of the diseased spleen (much the same thing as where it is absent) many occasions of remark will occur both theoric and practical, that serve to set aside this objection. Since then, if what nature does in the ordinary course of life, and what she is forc'd to do when put out of her bias and reduc'd to extremities, concur to establish our assertions, we think our selves secure.

We have accounted already for most of the *phenomena* upon those experiments. What remain are not difficult, and equally conclusive of our purpose. That such creatures make water more frequently, depends upon the supposition of their having more blood in proportion than otherwise, as before restrain'd, where the circulation must be encreas'd, which promotes the urine as all other fluid secretions. Thus *Brunner* observ'd when the *pancreas* was taken away that appetite was increas'd, for no other reason that I can imagin: hence the water of hysterics is much, white, uncocted and thin; so *Brunner's* dog that lost his spleen, made water frequently, and drank much. Just as we observ'd in the acuating juices of the stomach, rendring them more voracious, tho' after they had stuffed their stomachs, digestion slacken'd for want of the splenic auxiliaries. 'Tis a common observation among drunkards, that during the fit of a debauch, he is first fuddled that goes ofteneft to the urinal; that being an indication of a more accelerated motion of the blood, which by passing so much quicker thro' every part must needs encrease the heat, sooner affect the head, and cause drunkenness with its concomitant symptoms. Their being more salacious arises from the same cause, and which we find one of their drunken symptoms, the quicker circulation spiritualising the blood, and provoking all the stimulating fluids of venereal appetite. For tho' immediately more viscid secretions are perform'd where the current is slack, yet it's not doubted but all secretions in general are more expeditiously promoted, by frequent circulation and brisk pulse, which consequently must pour the blood more impetuously into the feminal vessels, as well as others. Lastly, that we may be able to give a guess at the importance of such a quantity of blood as the spleen will contain, and of what consequence it is to the animal oeconomy under the conduct of an organ endow'd with the above specify'd powers: we need only consider the ordinary complement of the menstrual *plethora*, which is the result of many days retention, and which amounts to about 3xx. Whereas we may well judge that a moderate and healthful spleen will contain at least 1bj, and which is constantly under its power and direction.

DISEASES. SECT. XVII. The residue of our time, as order requires, must be allotted to consideration of the diseases of the spleen, and what are properly so called, the VAPORS, whither that which goes under the title of hypochondriacism, peculiarly ascrib'd to men, or the more frequent torment of the fair sex, hysteric disorders. It's obvious the execution of this multifarious task would require a volume, and vastly exceed the boundaries of this lecture (which we have transgress'd already) should we pursue it thro' its utmost labyrinths. But presuming upon the great candor, as well as patience of the most learned auditory in the world, I shall at present observe, that in case the doctrine we have advanc'd be founded upon truth, the whole hysteric theory must be fetch'd from a somewhat different source than has hitherto generally obtain'd. Therefore I may perhaps more easily bespeak your curiosity whilst as concisely as possible I only pretend to trace out a general scheme of what may be said upon this disease, which both antients and moderns have attributed to the part, but, as far as I guess, not perfectly apprehended the reason. Whence probably the distemper has been found so difficult and stubborn, and as well as some others stil'd *opprobrium*, and *flagellum medicorum*. *Laurentius, Bessardus, &c.*

We said before, life, at least health, when the original *stamina* are sound, depends upon a libration or *æquipondium* of the solids and fluids mutually opposing each other, much as motion and attraction conserve the volubility of the celestial orbs by a contrary *nifus*. And this is what properly is meant by the constitution of a person, which varies one from another, or in different stages of life in the same, as these fundamental causes cooperate, or prevail one above the other. And the spleen is by us suppos'd the great *regulator* or watergauge to the heart, and *conservator* of this *æquilibrium*, like a court of admiralty within us; as the moon to our globe is sovereign of the seas, giving a motion salutary, regular and constant to the fluid element. I hope I may be excus'd for using such sort of comparisons, since nothing perfects our *idea's* so well as analogy from things evident to those we endeavor to make so, where the resemblance is tolerably just. How eminent then is the station of the spleen? for it is as necessary that the heart should move, as we may say, by rythm and concord, as that it move at all. There must be a nice adjusted plenitude in the vessels, or the animal pump will languish, be disturb'd, hurry'd or suffocated, as we have already and sufficiently inculcated. And if there be a deviation from this measure on one side or other for some continuance of time, thro' failure of this ballance of the spleen, (tho' we suppose all the other *viscera* and solids in good condition) great disorders must ensue thro'out the whole œconomy. . All secretions must be vitiated of course, the whole mass being of an undue compofure. Digestion is deprav'd, evacuations irregular; nature put upon a million of unguided sallies, convulsions, tumults, and the human machine become a seat of rebellion and misrule, and must suffer in a most unaccountable manner, such we call the vapors. A distemper of so dissimilar a complexion, that it is never alike in any two persons or scarce in two fits of the same person. *Sydenham* calls it *farrago quædam phænomenon incomposita atque inordinata*. Other diseases by many learned writers are well solv'd by particularities of the afore-mention'd deviations: but this is a complication of them all, and may appositely deserve the definition of a *morbis morborum*. Then, if we consider the consequences of it, when run to some length, and the whole frame drawn into

consent and defection, we need not wonder that without regard to the necessary varieties of age, sex, climate, constitution, diet and other nonnaturals, different passions, and a thousand variable incidents, the concomitant symptoms must be as proteiform as can possibly be imagin'd. That where a part is concern'd that has so distant and various a communication with others, where the accumulated depravation of so many noble uses as we above assign'd, falls on us with full weight, an hysteric *hydra* should be produc'd.

In a word, we may venture to call the vapors a relaxation of the tonic DEFINITION action of the spleen, whether from any proper disorder or defect in it self, or whether join'd with an universal relaxation of the vascular *compages* or solids in general, whether causing or caused. But rather beginning the prelude, which must soon be follow'd by the whole; whence it is but a sort of half life, and accompany'd with the utmost despondence and despair of relief. When we fix the rise and lay the scene thereof in the spirits, or to speak in more intelligible terms, the nervous system, we mistake the consequence and effect for the primary cause. But from hence the name of vapors seems to arise, pointing to those nimble agents in all animal actions, to which we fancy the quick transitions and volatile nature of the symptoms here are most like. As *Baglivi* makes the *meninges*, as it were, the heart of the brain; and I think all his doctrine *de fibra motrice* very much confirm'd by our modern practice of snuff-taking; so we make the spleen the heart of the *abdomen*. That each of the three cavities may have its great auxiliary and superintendant, which in their due subordination and harmonic co-operation, constitute the animal œconomy. The true heart indeed throws the blood to both the other, the *meninges* regulate the secretion of the animal spirits which is the cause of the motion to all: But the spleen presides o'er the fountain head, the organs of concoction and its dependent instruments of distribution of the chyle, which is to make the blood; the ocean whence all streams are deriv'd. and all vitality; not only so, but regulates it, that it may be really useful to the other two, and to the whole. So that for the true cause of this disease, we must search for the foundation, which if weak and defective, no wonder that the highest pinacles nod, and whose fall will only help to make the ruin greater. Such I take to be the case of the spleen in this complex malady, by the ancients call'd melancholy or black bile, which they suppos'd heaped up in the part, and wanted evacuation or volatilisation, so as to become good blood again, and fit for nutrition and other functions of the body. This notion they deriv'd from inspection, finding generally the spleen in this case much swell'd and stuffed with thick unactive blood. The yellow or true bile they thought of a dry and hot temper, this black bile or melancholic juice was cold or moist; meaning that in this circumstance the blood was of an undue crassitude, poverty and humidity, and wanted much of the fire which ripens all things. They observ'd too, that melancholics often vomited black matter-like stool, and made black urine with black sediment, all pronounc'd signs of the spleen affected, *Gal. Avicen. l. 1. fen. 2. doct. 3. c. 2. Actuar. i. de urin. judic. 20. Averrho. colliget. iv. 22. Piso §. 1.* That they had a *tremor*, when they awak'd, of all the parts of the left side; so that they saw the truth plainly, tho' by their term of refrigeration is meant relaxation, in our later way of speaking, an inactivity of the circulation, and *lensor* of the blood.

CAUSE. *Galen* defines the hysteric passion an *intemperies frigida*, which neither arises soon, nor ceases soon, which is no more than a lax and moist constitution, degenerated into an habitual indolence and remissness of action, between the solids and fluids, in which the spleen has so mighty an interest. *Gal.* ii. and 5. *de art. cur. ad Glauc.* calls it the distention of the spleen by *flatus's*. *Hipp.* says, *pituita* is always join'd with melancholy, and that the blood of such is full of *ichor* and crudities. So that splenetics have no great thirst tho' they make much water, they likewise sweat much, and spit for weeks together as if salivated. Any ulcerated part will run much. Old authors complain in these cases of the patients having drank much water. Now this moisture abounding, drowns the volatile salts in the blood, whence the spirits and principles of action in the body; and leaves it thick, black, sluggish, earthy and unqualify'd for its office. The vascular system, which it permeates and nourishes, is become consequently languid and unactive, and both go to wreck from the reciprocal dependance on each other. No marvel the symptoms of this malady are so infinitely various, that they suffer in every limb and member and *viscus*, even in the whole body to such a degree, that it appears like witchcraft, when it arises from a temper and constitution quite opposite. Most frequently indeed from that which is humid and remiss, yet sometimes from the dry, the hot and fiery, which by an extravagant evaporation and wasting of the fluid and spirituous parts of the sanguinary mass, leaves the blood in just the fore-mention'd condition, or creates this *atra bilis*, or stagnant state thereof, where it was not before; and this seems more peculiarly that melancholy which terminates in madness. So that to point out in few words the causes of the vapors, 'tis want of action or too much passion, the mind and body join hands in their own overthrow; any thing that depauperates the blood, wastes the spirits, that for some time together defeats the true proportion and harmony between the solids and fluids, which is maintain'd by the spleen. Such are a lazy indolent life, lying too long in bed, a stagnating, marshy, saline air, tedious fevers or other diseases, hæmorrhages, drinking too much water especially in winter, middle age and peircing wit, for a slow and temperate *genius* seldom runs into this excess. Too much study, especially upon one topic, variety being as much a relaxation, as total abstinence from books. Nocturnal lucubrations, excessive grief, care, solitude, watchings, solitude, too much indulgence of one passion, especially that predominant one of love. We may add too much labor and fatigue in a hot, dry air or season, salt food, an abuse of spirituous liquors, which in reality drink up the vital flame. And sometime 'tis hereditary, as *Hipp.* says. Nor does any thing hinder but that there may be an original and natural debility in the part as well as acquir'd, particularly where the solids in general appear to be soft and lax. Therefore this being a distemper that scholars and ingenious people are more addicted to than others, the consideration of it must needs be very inviting, but above all in compassion to the tender sex, without whom the world it self would incur the disease, they being one main spring of all action in the wondrous machine.

MELANCHOLY.

Aristotle probl. §. 30. enquires why this melancholy should prove so obnoxious to men that have been most famous for war, for wit, philosophy, legislature, poetry, arts, &c. such as *Hercules*, *Ajax*, *Bellerophon*, *Empedocles*, *Socrates*, *Plato*, *Heraclitus*, *Timon* and the like, who all dy'd of this distemper; v. *Drelincourt. de lienosis* p. 44. *Hercules* burnt himself

on

on his own funeral pile, *Ajax* flew himself with *Hector's* sword, *Bellerophon* wander'd in the *Aleian* fields,

Is miser Elæis solus errabat in agris,

Ipse suum cor edens, hominum vestigia vitans. Hom. Il. iii. v. 202.

Lucian in his comment on astrology supposes *Bellerophon* a great student in that science, which made him vapor'd and melancholy, and a lover of solitude. Thence the fable of his being thrown off *Pegasus* into these famous fields, where I suppose he walk'd to contemplate the heavenly motions. This is *Tully's* opinion *Tusc. qu. iii. n. 26.* *Eustach. t. i. p. 494. 13.*

Sic nimiae bilis morbum assignavit Homerus

Bellerophonteis sollicitudinibus.

Nam juveni offenso sævi post tela doloris

Dicitur humanum displicuisse genus.

Rutil.

No more is meant by the eating of the heart or liver of *Tityus*, *Prometheus*. So *Empedocles* threw his life away in a fit, and little did *Aristotle* think it would be his own case. And thus was the fate of many other of the famous ancients, as *Sappho*, which gave rise to the several fables and invention of the greek poets. What can we think otherways of *Orpheus*? thus *Virgil* describes his symptoms for loss of his wife, *Georg. iv.*

Septem illum totos perhibent ex ordine menses

Rupe sub aëria deserti ad Strymonis undam

Flevisse, & gelidis hæc evoluisse sub antris.

Solus hyperboreas glacies Tanaimque nivalem,

Arvaque Riphæis nunquam viduata pruinis

Lustrabat, raptam Eurydicen atque irrita Ditis

Dona querens.——

Ovid thus,

——Septem tamen ille diebus

Squallidus in ripa Cereris sine munere sedit,

Cura dolorque animi lacrymaque alimenta fuere.

Met. x.

I imagine the same of the Sybils and Prophetesses, of the dancing *Corybantes*, the revelling Bacchinalians, &c. and Priests in general, who from their secret and silent way of life fell into this calamity, as our modern Carthusians, Hermits, Monks, Dervis, &c. So that when they came to exercise their offices, they were forc'd to make themselves drunk and mad, and all their extravagant actions and speeches were taken for sacred fury and inspiration. Then was the time they gave oracles, then they fancy'd themselves, or were vulgarly thought to be, possess'd with a supernatural spirit of wisdom and foresight. And not long since have we seen somewhat very like this in *England*.

The spring and elasticity of the spleen thus debilitated, and render'd torpid, listless, we must expect it should be loaded and crouded full of blood, and swell'd to a preternatural bulk, consequently obstructed and idle in all its great offices, and more and more unable to resist the common impulse of the arteries; so that it becomes heavy according to the mind of the ancients, in reality as well as feeling, v. *Friend's Emmenolog. p. 80.* and a saturnine bowel as *Helmont* calls it, which signifies no more than diseased; for sound parts have or create no sense of weight. In some from their infancy the spleen is excessive in bulk, or impotent. *Hipp.* observes that people born or living in moist fenny countries have larger spleens than usual, where they make use of stagnant water. Splenetics are generally

generally of a full, large, lax, fanguine habit, *laxiore crudoque* says *Sydenham*, fair of complexion and inclineable to fat, and naturally subject to gout, rheumatism. And people that have large veins tho' lean, have larger spleens. *Hipp.* ii. *prorhet.* t. 42. gives us a way to know those under such circumstances, that the skin appears very full and prominent under the eyes. I suppose he means the lower part of the *orbicularis* muscle lying on the cheek-bone. Let me add another diagnostic from my own observation, such as have large legs, rather thicker and more muscular than should be the proportion to their body, and commonly have narrow shoulders, pale and thin visage. They that are subject to bleed much at nose have large spleens, and those that indulge drinking too much when young, which lays a foundation for this disease. *Lindanius* says, the common people of *Frisia* who drink much buttermilk have large spleens. All great authors confirm its growing large in an unhealthy state and evil digestion. *Hipp.* de loc. in hom. *Plato* in *Timeo*. *Gal.* ii. de nat. fac. 9. *Vesalius* saw it so in an *elephantiasis*. *Ballonius* observ'd it putrid in melancholics. *Car. Piso* oft found it turgid, and of a pitchy color in quartans. *Fernelius*, who dy'd of a melancholic quartan, had his spleen inflam'd, swol'n full of clotted blood like black pitch, says *Plautius* in his life. *Vesalius* saw one so large that it cover'd the stomach, and grew to the liver, in substance like that of found people, v. 9. one nearly as big in the next page. *Ætius* x. 7. 16. says, it sometime grows so large that it will reach down to the *pelvis* in length, and approach to the liver in breadth; observ'd too by *Aretæus* i. *chron.* 14. and in *Plaut. Curculio act.* 2. In a woman from whom I made a vertical section in the house of the royal society *feb.* 1720, the spleen was very large, reaching to the *pelvis*, it was nine inches long, and weigh'd lbij ss. *Hipp.* says, ulcers in the legs of such are difficultly heal'd. This woman dy'd with an ulcer in her knee. In an infirm man dissected in this theater, PLATE VII. the spleen was ten inches and a half long, six broad. Mr. *Becket* from his cases observ'd in St. *Thomas's* hospital, told me of a young man that contracted an ill habit of body, and had an ulcer in his leg, which puzzled the utmost efforts of the surgeons to heal. After it had for a long while been kept to the compass of a sixpence, on a sudden irritated by their incisions, it broke out into fresh ulcers all around, and enlarg'd it self to a hand's breadth; then a looseness seiz'd the man, he became of an ill countenance, lost his appetite and dy'd: nothing remarkable when open'd but the excessive bulk of the spleen, weighing five pounds four ounces. He has another dying of an *ascites*, who had a sordid ulcer in each leg, hardly to be kept from mortifying, with abundance of cuticular eruptions discharging much serosity. The man's countenance like the former, his liver and spleen very large and schirrous: which instances confirm the great sagacity and careful observation of *Hipp.* *Horstius* mentions two or three vast spleens, and of unusual shapes, one weigh'd above two pounds, and had three vessels inserted into it from the mesentery, one in the middle, and one at each end. Mr. *Cheselden* in a boy found a diseased one of three pound: in a man, five pound two ounces. *Hildan.* cent. ii. *obs.* 45. and *epist.* 55. the spleen and liver of an excessive bulk in a woman, so that she thought herself with child; great hardness and swelling on the left side, the spleen grew to one side of the liver, which shows there had been an inflammation withal, the *vas breve* small and obstructed. *Chesneau* gives an account of a woman at *Tholouse* having a great tumor in her left hypochondre

chondre reaching down very low, so that they took it for a rising of the womb: upon opening her body they found the spleen swell'd to that degree. *Bartholin. cent. i. hist. 80.* saw one two spans long, four pound weight, the *vas breve* very large and divided into four branches. *Flammerding* saw a spleen of forty three pound; *de tum. lien. Colum. l. xv. anat.* has found them of twenty pound, cartilaginous externally: One of six pound in *Bonet. anat. pract. p. 958.* *Diemerbroek* found one as large as a man's head, *anat. i. 15.* and cites from *Wepfer* one in a woman weighing six pound. *Cabrolus* one of five pound. *obs. 6.* *Skenkius* one of twenty three pound. *iii. obs. 9.* There have been vastly larger, as that which cover'd the whole contents of the *abdomen* in a woman, yet she had children and lived very well. Others of like enormity in *Aretæus i. chron. 14. Ætius tetrab. 3. serm. 2. c. 7. Trallian. viii. 12.* and many more authors. *Drelincourt. p. 101. de lienosis.* The spleen encreas'd to a monstrous degree in a melancholic unactive young woman, whence suppression of the *mensès. phil. transf. n^o 194. p. 543.* *Fernelius* says he has seen it bigger than the liver. *physiolog. c. 7.* *Blasius* has an instance of the spleen very hard of three pound weight, found in a melancholic. *obs. med. 22.* These extravagant instances are sufficient to show how much the welfare of our body depends upon this *viscus*, and how necessary it is to keep the blood in due fluidity and distribution, from its rightly dispos'd tonic action. *Hipp. iv. de morbis* says the head and spleen are mostly obnoxious to diseases, being parts of capacity. And *Galen* well compar'd it to a bank or treasury, *ii. 9. de natural. fac. Plato in Timæo.* So *Trajan* the emperor us'd the same similitude; saying as the coffers of the prince were enrich'd, the common people were impoverish'd. *Aur. Vict. epit. Rhodigin. iv. 18.* meaning as the spleen encreases in bulk, the body grows lean.

This stagnation of the blood will certainly first beign its tragedy in the lower belly or hypochondres, whence the name of the disease, and where the seat of the spleen, where the blood-vessels largest, most numerous, especially the veins going to the *porta*, which we observ'd by the design of nature are to slacken its course for the purpose of the liver. If the circulation in general be slow, here it consequently must be much slower, as receiving no help by ordinary muscular action and exercise of the limbs, and especially from the arterial force of the neighboring spleen. Here can be suppos'd no want of rebatement in the caverns of the spleen which is become the disease. Patients of this sort therefore are of a fallow complexion, the lively and florid color of the face vanishes, whence the jest of *lienosi omnes mortui, Strab. xiv. Stratonicus* the harper a witty fellow found all the inhabitants of *Caunia* lienosè and pale; when they reprehended him for jesting upon them and accusing their city as unhealthful: God forbid, says he, that I should think so, when I see even dead men walk in it. *Cælius iv. 18.* So a wan or dark color succeeds, as in *Anaxenor*, in *Antilocus*, and *Alevas* in *Hipp.* they have a slow pulse and respiration, they feel a perpetual weight and heaviness, especially after meals, with a head-ach, difficulty of breathing, have faint sweats, a frequent coldness all over the body; bilious vomitings, *nausea*, slower, fetid belchings, *Aretæ. diuturn. i. 5.* crudities, flatus, rumbling in the guts, whence the disease has got the name of flatulency in *Gal. Hipp. &c.* dejections of slimy, acrimonious, bilious matter; gripes, constipated belly, loss of appetite, all depravations of our afore-assigned uses of the spleen, with utmost dejection of spirit. They make

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much

much water, but without relief, as if seiz'd with a *diabetes*; *Aretæ. diurn. ii. c. 2.* the fluidity of the blood being more lessen'd, by a clear and unconcocted effusion. Stoppages of the *menstrua*, inflations, pains of the *hypochondria*, loyns, back, swellings of the leggs. *Syncope*, dulness of the eyes, unquiet sleep, *clavus hystericus* from obstruction of some vessels in the *meninges*, and too frequently that horrid pest of mankind the *polypus* in the heart. Fantastic, whimsical notions, peevishness, passion and the like. Spontaneous lassitude, and many scorbutic symptoms, as spots, livid suffusions, which in time itch and grow ulcerous; but generally above all, a sharp and wandring pain in the left hypochondre the fountain of all the rest, and which even the horse-doctors remark in their cattle; *Apfyrtus veter. 40.* the tumor of the left *hypochondrium* will increase after dinner, upon motion or anger that inflames the blood, or by a contrary reason upon sadness, the blood falling into it as a sink, as *Lælius a fonte* calls it. Frequently they have a symptomatic greediness and unreasonable appetite, as was observ'd in dogs without spleen, and thirst too, and all the symptoms of epileptic fits. *Ilias quartanarum lienis imbecillitatem succedit*, says *Bal-lonius i. de morb. mul. f. 70.* They spit much, which *Galen ex Diocle. 3. de loc. affect.* mentions most common among hyochondriacs. And in a word, what remarkably proves our doctrine just, *Booerhave* affirms, have all the symptoms that attend creatures from whom the spleen is cut out. *Institution. p. 77.* It's observ'd the symptomatic vomiting lasting, the swelling of the spleen abates, and *vice versa*. The reason is, because that convulsion draws the spleen by consent to exert it self, and discharge its blood; when the vomiting ceases the left hypochondre swells, and yellow suffusions of the skin succeed, the liver suffering in its office at the same time for want of the power of the spleen. Well may *Hippocrates* call those splenetic whose spleen is hard, and speak so much of the rising of the spleen, *vi. de morb. popul. §. 2. & alibi.* and hence the whole pathology of the hysteric colic. The vast quantity of biliose matter thrown up by vomiting, or downwards by *diarrhea*, and still tinging the skin, shows this overmuch siziness of the blood destin'd for that secretion, generally in the whole mass, particularly in the abdominal vessels. From which, and its stimulating quality, when the head is attack'd, *coma's*, epilepsy, apoplexy, or the numbness of a part ensue, or talkativeness, tremors, spasms, head-ach; when the heart, palpitations, swooning, anxiety; when the breast, sighing, short-breath, cough; when the diaphragm, laughing; when the belly (and more frequently being the seat of the morbid *minera*) *rugitus, cardialgia*, colic, iliac passion, &c. when the reins, nephritic symptoms, and the like, and sometime all together; the reason of which is easily apprehended without descending to particular solutions, not at this time to be indulg'd.

When nature has suffer'd for some time under these pressures, and you may very plainly feel the tumify'd spleen in the left hypochondre, she begins then to rouse her self, and look out for relief. The heart, in this case the *dernier ressort*, and the splenic artery begin a prodigious pulsation in the part, in order to remove this accumulated excess of blood, which sometime arises to convulsion and inflammation. We have divers accounts from physicians how the spleen or its arteries shall strike so strongly against the ribs, that it may be seen, and even heard to make a noise as of strokes inflicted, at the distance of thirty foot, v. *Bonet. sepulchret. p. 979. Tul-*

pius ii. *obs.* 28. The patients can feel it rowl within them as in anguish, and the whole belly shall be stretch'd out like a drum, all the membranous parts consenting therewith. Sometime they fancy that they feel a bird or some live thing jumping or fluttering within. V. *Arculanus in non. Rhaf.* c. 100. *Erastus in Hipp. progn. Claudin. conf.* 46. 62, and 74. *Bontius obs. indic.* 8. and all observ'd before by *Hipp.* Some have fancy'd themselves possess'd with an internal devil; others a frog leaping, and that they can hear it croak. *Drelincourt* p. 117. *de lienos.* says, the lienal artery shall beat so powerfully that the whole left *hypochondrium* will be shaken as far as the navel. As *Riolan* says, *agerque percipit inter se volitantis aviculæ speciem.* *Hipp.* in the case of *Lycia* who was splenetic, observ'd the left basifical artery to have a far stronger pulse than the right. 'Tis at this *stadium* of the distemper that lienose have a red face and flushings of blood after dinner, the palms of the hands are hot, strange struggles and variations in the pulse, throbbings of the heart, wandring pains and prickings all over the body, which demonstrate the efforts of nature. Fevers, *mensēs*, bleeding at nose, *anus*, and other salutary exertions show themselves, which if prudently improv'd by the physician co-operating, restore the patient, as the wife of *Hippostratus* in *Hippocrates*.

As the excessive bulk and weakness of the spleen is chargeable with these ruinous consequences: so sometime it offends as much on the other hand MINUTE
SPLEEN. by its unreasonable minuteness, equally incapable of executing its assigned purposes. Sometimes it happens that other accidents disqualify it, as stones bred in its cavities, or its coats growing coriaceous. Many instances of both kinds in *Drelincourt*, p. 109. and he gives us a good hint at a solution of the ancient fabulous catastrophe of *Niobe*, *Atlas*, &c. who probably dy'd of melancholy.

In vultu color est sine sanguine lumina mæstis,

Stant immota genis nihil est in imagine vivum.

Ipsa quoque interius cum duro lingua palato

Congelat, & venæ desistunt posse moveri. Ovid Met.

Tully 3. *Tusc. quæst.* says, *Niobe fingitur lapidea propter æternum, credo, in luctu silentium.* *Thoner epist.* 2. l. vi. mentions one dying melancholic, that had an extraordinary small spleen not weighing above an ounce. *Laurentius* mentions another such. *Vesalius* v. 9. observ'd in one that dy'd of the jaundice the liver large, hard and green of color, the spleen large and soft. He mentions two who dy'd of the dropfy, the spleen white and small. These two diseases are most frequently conjoin'd with or consequent to the affection of the spleen, as it proves deficient in administering to the liver in the manner above propos'd; and as the extraordinary quantity of the fluid part of the blood is voided thro' the broken lymphatics instead of the other by urine, sweat, or spitting. *Morgagni anatom. adversar.* iii. p. 46. in a priest and a virgin found it wasted away after a long sickness. *Bontius obs.* 7. saw it like a little ball. *Vidus Vidius* x. 10. *de cur. membr.* of the bulk of a pigeon's egg. *Salmuth cent.* i. *obs.* 21. as big only as ones thumb. *Thuanus's* in *Riolan* weighed not an ounce. *Peyerus hist. anatom.* as big as a bean. *Conringius* 6. *de sang.* less than the bredth of a nail of ones finger. *Litrius* in a sickly man wasted away, in another he found it petrify'd, or rather ossify'd. *hist. del' acad. R. de science.* *Hildanus cent.* 2. *obs.* 44. the spleen with other viscera and the vessels full of limy matter. *Drelincourt* has seen some small spleens, but as heavy as stones,

stones; and many perfectly shrivel'd up and contracted. *Hipp. de intern. affect.* says the spleen will sometime be as hard as a stone. Sometime it will become hard, and when cut thro' make a noise like a cork, an instance in *Bartholin cent. 4. obs. 60.* *Turnebiserus in exam. urin.* saw a stone as big as a chesnut, whitish and soft as alabaſter in the spleen, compos'd of layers which weigh'd 3ijls. 3j. at full-moon this girl always felt a pain in that side. *Nichol. Fontana* found a large spleen fill'd full of white stones in two instances. One in *Vesalius* dy'd after three years imprisonment, of the black jaundice, his spleen waſted away, dry and hard; another dy'd of a dropſy where it was white and ſmall. It's frequently ſeen in a ſheep eſpecially, that the inner tunicle has chalky ſtuff fix'd to it, *melicerides* and other ſort of tumors, from extraneous matter forc'd out of the extremities of its veſſels and cells; doubtleſs upon its frequent act of conſtriction. Sometime in this diſeaſe the spleen has been corrupted and turn'd into a maſh, by the corroſive fermentations of its ſtagnating blood, as *Drelincourt* obſerves p. 87. *de lienofis.* So that from theſe exceſſes and defects we may ſafely gather that the moderate spleen is moſt healthy; as *Ariſtotle* concludes iii. *hiſt. anim.* 16. So the butchers uſe that and the liver as a teſt of the health of the cattle they kill. So the spleen of the famous old *Parr* upon his diſſection by the great *Harvey* appear'd but ſmall, about the bulk of a kidney.

All the inſtances of the coats of the ſpleen becoming coriaceous (§. iii. 5.) produce the ſame evil diſpoſition and incapacity of its duty, they ſeem owing to the ſame cauſe that creates offifications at the mouth of the great artery at the heart, and in other parts of the arteries; to wit, the continual impuſe of the warm blood, ſo near the ſpring of its heat, to which the ſpleen claims the neareſt vicinity, as moſt ſuitable to the dignity of its office. Such an opinion had *Hippocrates* of this vivific faculty thereof, that he thought even its inclination one way or other from its moſt uſual and natural ſituation carry'd a larger quantity of blood and ſpirits that way. In his vi. *Epid.* §. 2. he pronounces, *quibus deorſum vergit lien, his pedes & genua calent, naſus & aures frigent*, the extreme upper parts ſuffering thereby. Pertinent to which *Sydenham* has obſerv'd in hyſterics a ſtrange coldneſs in ſome external parts like to a dead corpe. Nay even the venal blood of the ſpleen is more freſh and diluted than any other thro'out the body, as *Boerhaave* takes notice p. 77. *inſtitut.*

LAUGHTER.

If ſuch then be the benefits, ſuch the illſ depending on the diſpoſition of the ſpleen, the ancients had a more than metaphorical reaſon to aſſign this part the honor of mirth and jollity, health and love, &c.

Splen tumidus nocet, & riſum reddit ineptum.

Dicitur ex ſectis faciles auferre cachinnos,

Perpetuoque ævo frontem præſtare ſeveram.

Seren. c. 22.

V. *Euſtath. in æ Iliad.* . v. 559. *Rhodigin.* iii. 12. and 22. *Pliny* ii. 37.

Laughter was counted a God by *Apuleius met.* ii. and iii. *Scholiaſt. in Ariſtoph. cereal. Porta phyſiogn.* xxi. A fit of laughter has often cur'd a fit of the ſpleen. Laughter is a paſſion proper to the human race, and certainly is aſſiſted by the ſpleen; as in that convulſion, the diaphragmatic and phrenic branches give and receive blood readily to it. The ſpleen only in human bodies is faſtned to the diaphragm, and its concuſſions reciprocally aſſiſt the ſpleen, whence mirth at meals muſt be very uſeful towards a good diſteſtion; by forwarding its help to the ſtomach in the manner we deſcrib'd.

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Tho' not from laughing, yet in common respiration, nature has indulg'd this service to brutes, by placing the spleen in a length parallel to the diaphragm, between which, the stomach and intestines, it is so squeez'd in breathing, as that the blood must be forc'd up to the stomach from it alternately as from a cistern. From whence, and by promoting its fluidity, we may understand *Plato*, *Jul. Pollux*. ii. 4. and others, who thought this jollity was procur'd by defecating the blood, and concocting the *atra bilis*, which made folks peevish. *Serv. in æn.* xii. *splene ridemus*. The concernment between the spleen and laughter seems further inculcated from the two very large communicating nerves, between (only) the left intercostal, whence the splenic nerves and diaphragmatic, with the muscles of the face, which is not found in brutes. Wisely therefore did our ancestors keep their jesters to entertain them at dinner, to make 'em laugh and digest well, the first topick of health; whence they begat an athletic and hardy race, that did such wonders in arms. Quite contrary to the practice in religious houses, colleges, where the scripture is preposterously read at meal-times, and a superfluous demureness of countenance prepares them for all the diseases of an unactive spleen. Indeed it's notorious enough how the hysteric train of ills has gain'd ground, since action in both sexes is diffus'd, which with chearfulness is one great method of preventing and curing the vapors. The wheels of life grow rusty without continual motion, and death is no other than a cessation of motion. 'Tis not above a hundred years ago since all excellence was chiefly plac'd in exercise, feats of arms and tryals of strength, and most of our diversions were of that sort; but now we have no appearance thereof but hunting and horse-races. Our leaving the country for cities and great towns, coffeehouses and domestic track of business, our sedate life and excesses together, have prepar'd a plentiful harvest for these disorders. The remedy therefore is obvious; and without the concurrence of chearfulness, exercise, open air and conversation, all medicine is impotent. The hysteric malady, says the accurate *Sydenham*, makes up one half of chronical diseases, few women escape without somewhat of this sort, except such as work hard, and most men that live a sedentary studious life are obnoxious. That women have it more frequently than men, is accountable from the specific delicacy and softness of their composition, their more tender frame, and the less elastic *compages* of their solids. Moreover because they generally use less exercise than the men in all civil countries, and that the womb is in some measure analogous to the spleen as we have shewn above; consequently furnishes one more occasion of the distemper, which does not a little corroborate our reasoning, not unjustly did the ancients charge the spleen and womb with this malady. Hence the symptoms of menstrual suppression and spleen are alike, and the cure too, being both plethora's, accompany'd with a *lentor* of the blood, and this has given it the name of hysteric. In one the tonic action of the *uterus* is vitiated, as that of the spleen in the other case. Steel and sulphurated medicines good in both, to which with *Fonsæca* we may join the Piles, who says that these are endemical at *Venice*, *Padua*, and thereabouts in that watery situation, whence the melancholic sullen habit of those people. They drink much water too with their wine, and that bad, which relaxes the natural strength of the solids. *Hipp. de aëre aquis & loc.* makes *lienes* and *hæmorrhoides* akin, both arising from a redundant humidity. *Chesneau* says, the people of *Marseilles* are subject to the spleen from their marine

scite. One great diagnostic of the spleen's being affected, is the face discolored and wan. *Gal.* v. 6. *de loc. affect.* and l. *de atra bile*, *Hipp.* *de affect.* & *de intern. effect.* & *de loc. in hom.* *Gal.* ii. *de natural. facultat.* So the natural color of the face changes in women with child, and in disorders of the *menfes* as in splenetics. A nice and delicate woman tho' perfectly in health, upon a vomit or a purge given that works smartly, shall immediately, says *Sydenham*, be attack'd with some hyfteric symptom; whence he infers this distemper lies not in the humors evacuated, and only seems owing to the *æquilibrium* between the solids and fluids injur'd; the debilitated spleen being not able to perform its office quick enough, in restoring a due quantity of blood into the convulsed parts, and keeping up the tenor of the circulation. This is further confirm'd, because the like disorders oftner and more certainly ensue upon a sudden loss of blood by art, nature, or accident, as v. f. childbed, fasting, hæmorrhoids, &c. which shows that the arterial and venal system has but a just quantity of fluid ordinarily, and wants to be supply'd out of the superfluity in the *diverticulum* of the spleen, in this case not readily affording it thro' its contracted weakness. Women likewise addicted to *menstrum profluvium nimium* are most frequently hyfterical. Nor is it to be wonder'd at, that quite opposite cases produce the same malady. *Riverius cent.* i. *obs.* 94. gives us an instance. This proves that the animal constitution, as *Glisson* words it, is chiefly affected in this disease; that is, the *æquilibrium* of the blood is destroy'd one way or other, either by too great or too small a quantity. For where there is a paucity of blood, and the solids overcome the fluids for want of the splenic ballance, 'tis the same thing as if the tone of the spleen was quite relax'd, and not able to co-operate against the heart. So in women after a long fit of illness, the *menfes* return but slowly, an argument that nature requires some time to raise the *plethora* again, which is always necessary. Often likewise after lying-in, they intermit two or three returns for the same reason. *Vesalius* v. 9. tells us of a man who by the ill look of his face was judg'd lienose, accordingly his spleen was found soft, very large, and in color like a healthful liver. There is an account in *phil. transf.* n^o 194. p. 543. by Dr. *Grew*, of the spleen in an unactive girl swollen to an immense degree, all the other parts sound, the blood in it was very good, but from a relaxation of its fibres, was only able to receive, not expel it again proportionate to expence: which distemper she acquir'd by indolence and want of action. Whence we may learn a caution, how necessary it is in young people especially, and dictated to us by nature, in the ludicrous sports which ought to be indulg'd in all children.

EXERCISE. Sufficient exercise, as it must be accounted a prevention, so a main remedy of the vapors. 'Tis the principal weight of our machine, that conserves the motion of its numerous wheels and pullies. 'Tis the grand agent of the greater and lesser world. External voluntary action promotes and assists the involuntary ones, gives a smartness and brisk tension to all the fibers, in a true sense corroborates the *viscera*, and furthers their secretions. The blood is push'd on with celerity, acquires a due *fluor* and heat thereby, so that it is ripe for its manifold uses. Hence the *saliva* starts from the glands of the mouth upon sight of food, the spleen is ready to pour its *alcohol* upon the matrafs of the stomach, the pancreatic, hepatic, lacteal fluices are open, the strutting lymphatics are eager to evacuate, and the thoracic chanel to receive the lucid chyle, and convey it into the blood;

there to obtain a new character and be fitted for the noble use of nutrition, and at length exalted into the sublimest material form, that of animal spirits; which thro' a circulation of motions become the instruments of repeating the same work again. Thus the spring of a watch by a constant *nifus* and reasonable use retains its tone, but if thrown by for some time, it grows rusty, brittle and useless: just as idleness of the distractile fibres slackens the blood's motion, vitiates all the *apparatus* of digestion now mention'd, and all secretions in general. The spirits become poor and impotent, the blood cold, effete, viscid, and unfit to pass thro' the minute arteries, apt to coagulate, especially in the mesenteric vessels and neighboring spleen, which now becomes the lazy sink of the body, insted of the seat of mirth and laughter.

Many instances experience and authors afford of splenetics cur'd by a pertinacious course of labor; such as that of *Orchemenes* the *Lacedemonian* mention'd in *Plutarch*, who was recover'd by a gradual and continual exercise of running: the same of *Laomedon*. *Ælian* relates the same of *Straton* in the olympic courses. Labor is often inculcated by *Hipp. de intern. affect.* in cure of this distemper. Nay he even orders his patients to hew timber for thirty days; a good hint to our nice gentry, that think it beneath them to use even their own legs. In this title we may include dancing, finging, and every thing that procures muscular motion, and quickens respiration. But above all things riding is especially beneficial in hypochondriacism, as acting more adequately upon the vessels of the *abdomen* by uninterrupted concussions, and the new oscillation it excites in the universal solids. And in this great advantage it exceeds all exercises and diversions, that as they tire, fatigue and waste the spirits, this relieves, invigorates and briskens them, by this we reap all the desired benefits without the expence. Next to exercise temperance, and which in some measure supplies it. Few people suffer for want, whilst millions are conducted to untimely shades by the trencher and bottle. *Eudemus* in *Hipp.* was cured thus by v. f. spare diet and drink, which was small red wine. By fasting, *Thesalus* in *Gal.* It's mention'd in authors, that sometime this melancholy has been caus'd by abstinence from *Venus*, which is a sort of resuscitation of the spirits and circulation. For *Hippocrates, diat. ii. 36.* says it attenuates and heats the blood. Hence *Gal.* speaks of one who became splenetic after the death of his wife. *Fonseca* is very particular in his advice upon this case, *Consultat. lxxxv.* Nevertheless without the golden mean necessary in every thing, the unwary may incur the case of *Damnagoras* in *Hipp.* who fell into the distemper by venery inflaming the blood.

We have observ'd, that one of the appearances exhibited to us by dogs mutilated of the spleen, was that they are apt to become mangy or scorbutic, which is no other than a symptom of our disease. Having no spleen is the same thing as having one obstructed, or impotent in its duty. The pains we mention'd before all over the body are owing to the corrosions of these acrid scorbutic salts. The earthy and unactive state of the blood renders it unfit to pass thro' the minute arteries in the outward habit, where portions of it stagnate, and at last make their way thro' the skin by scabs, spots, &c. not only the *polypus's* but extravasations of all sorts, together with aneurisms, *varices*, *hydatides*, and the *schirrus's* upon the bowels, come into this predicament. *Polypus's* have been found even in the lienal artery as well as others. *Drelincourt* p. 79. *Ulmus Junior* affirms, that out of the arm of a melancholic, in ordinary venæsection, a
grume

grume of black adust blood of a finger's length has been extracted. Such mention'd in *Baglivi* p. 304. 339. *Bartholin cent. i. hist. 38.* the *scelotyrbe* and *stomacace* commonly the scurvy describ'd by *Hipp. ii. prorhet.* is this largeness of the spleen with rotten gums and stinking breath. *Quibus lienes magni sunt iis gingivæ vitiantur & os grave olet,* again *quibus lienes magni sunt, & neque sanguinis eruptiones contingunt neque os grave olet, ii in tibiis mala ulcera habent & nigras cicatrices.* Hence the great aneurisms of the lienal artery taken notice of by *Drelincourt*, and *Arantius obs. 35.* *Coiterus obs. anatom. anni 1565.* *Ephemer. Germ. obs. 30. anni 1673.* and the swelling of it to such a degree, that it crowds it self up to the *thorax*, and disturbs the province of its neighboring cavity. *Vid. Reusner* and *Senner-tus.* *Glisson* observes the *vas breve* sometime will become varicose, and sometime broke, throws blood into the stomach. As in the case *Dr. Tanc-red Robinson* informs me of in a patient of his, who after a violent vomiting of blood for three days continuance expir'd. His body was open'd by *Mr. Cooper*, they found the spleen very turgid, and reasonably conjectur'd the evacuation was deriv'd thence. *Bartholin* mentions a splenetic person, wherein nature emptied her self of a superfluous *plethora* by the spleen; for he vomited up 16lb of blood without harm. And this proves the necessity of having such a *diverticulum* of the spleen to lodge the over-plus: how otherwise can we account for that case in *Baglivi* p. 341. where an inflammation of the spleen happen'd from suppression of an hæmorrhage by cupping, the redundance of blood naturally running and oppressing its accustom'd receptacle. Whence he adds vomiting blood becomes so familiar to splenetics, it being so ready a way for the spleen to evacuate it self.

The neurology of the spleen furnishes us with another pregnant proof of our theory, particularly in that solemn rising of the throat in hysterics, deducible from the communication between the *par vagum* and intercostal nerve, for there is an eminent branch from the middle *plexus* or *cervicalis* of the left intercostal nerve, and proper to human kind, which goes to the recurrent nerve on the left side only, which is plac'd on the *trachea* and *gula* on its whole length, besides six smaller twigs common on both sides. This being the proper nerve of the spleen, when it is painfully affected must needs cause a convulsive corrugation on those parts, and difficulty of breath. And this motion is felt to begin from the bottom and go upward, as the recurrent nerve does, just as tickling about the hypochondres causes laughter; because the diaphragmatic nerve arises from that which goes to the muscles of the face. It's no wonder that the diseases of the bowels, particularly the spleen, should be so cognoscible in the face, as is commonly observ'd, when the intercostal nerve arises directly from the *par quintum*, which is distributed to the whole face, and *sextum* which goes to the eyes, which is a remarkable providence in nature, to discover the affairs relative to the distribution of the aliment in the most conspicuous part. Hence the symptoms of immoderate laughings and weepings in splenetics. And after all that I have been able to gather, from the great deal that has been wrote on the use and design of nature, in forming what we call the *ganglia* or *plexus's* of the nerves, I can assign them no better, than that they should be a sort of spleen to the nerves, and act upon those canals and the subtle fluid contain'd in them, after a like manner as the spleen does upon the circulatory vessels of the blood. “ The splenic *plexus*, says *Vieussens* in “ his neurography, communicating with the stomachic, epatic, renal, and
“ upper

“ upper mesenteric, fully shows the reason why vomiting generally at-
 “ tends inflations of the spleen, together with nephritic and colic pains.
 “ Again he says, ’tis plain the splenic nerve has its motions from the great
 “ perturbations that are wont to happen in the left side of hypochon-
 “ driacs; and the constrictions of the bowels with violent shakings as it
 “ were, accompany’d with wandring pains, arise from the corrugations of
 “ the splenic nerves, which not only excite tumults in its own neighbour-
 “ hood, but likewise in the heart, and sometime the whole body. For in
 “ hypochondriacs we find as soon as the spleen suffers, the parts about the
 “ heart are drawn downwards and most violently compress’d, so that they
 “ become sad and dejected, complain of the utmost straitness of breathing and
 “ the like, and give themselves up for expiring people.” *Willis* makes the
 intercostal nerve chiefly concern’d in hysteric affections, for he gives it as
 a reason why vomitings then so frequently happen, because the nerves go
 from the intercostal to the stomach, c. ii. §. i. And what they call the ri-
 sing of the mother, is only the like consent and convulsion of the mesentery,
 the womb and parts adjacent; and this is in both sexes, frequently in our
 bills of mortality call’d the rising of the lights. ’Tis in general the appen-
 dages of the spleen, the whole mesentery with what belongs to it. For ’tis not
 to be imagin’d that the womb itself rises in that manner, as the parties fancy,
 thinking that they feel somewhat as big as a cannon bullet: because ’tis plain the
 womb is immoveably fixt and cannot rise up. And that in women with child,
 when the womb presses upon the very stomach, or where there is a dropfy of
 the womb, that part being more extended, yet hysteric symptoms do not ensue.

The senses of smelling and tasting are much akin, what pleases or dis- SMELLS.
 pleases one, alike affects the other. Smelling of food immediately excites
 the appetite, and most frequently if one of these be lost, the other perishes
 by sympathy. Now the intercostal nerve furnishing the spleen and hypo-
 chondres with spirits, is deriv’d from the fifth pair, which in great measure
 serves the olfactory organs, and principally those of tasting. Whence we
 may easily deduce the reason, why strong fetid smells, such as castor, *asa*
fatida, burnt feathers, leather, and the like, so generally relieve hysterics.
 It seems just to suppose, that the nerves in this distemper are relax’d as well
 as the rest of the solids, therefore the motion of the spirits within them
 must be inordinate; and that these virose smells contract and new brace
 them up, and give them a more proportionate oscillation, and the spirits
 consequently a more composed motion. Therefore they recreate the
 whole nervous system in general by the olfactory nerves, and the *viscera* in
 particular by the intercostal, just as the smelling of volatile salts and spirits,
 or drinking a glass of strong liquor after fainting, immediately relieves with-
 out entering into the blood: or as brisk or chromatic music produces a new
 spring in the nerves, a fire in the blood, and raises a passion; whilst the
lydian soft mood quells it, and relaxes the nerves, as we may guess sweet
 smells do by their complacency; the one causing a violent vibration, the
 other a gentle one.

The great *Hippocrates* iv. *de morbis*, tells us the spleen evacuates it self EMETICS.
 four ways; by the mouth, nose, urine and *anus*, which in few words is an
 universal direction for the cure of this distemper, and shows the extensive-
 ness of the spleen’s communication and operation. Here are the two great
 intentions hinted at, of agitating and spiritualising the blood, together with
 defecating and lessning the quantity; and strengthening the solids, whereby

nature is restor'd to her pristin *æquilibrium*. Emetics therefore are extremely useful and necessary in the beginning, and to be repeated at proper intervals, especially as icteric symptoms most frequently accompany. *Fonfeca* says twice in a month; but if it be doubled, not amiss. These are powerful above all things in giving motion to the spleen, and all the vessels of the *abdomen*, drawn into consent by that salutary convulsion of the stomach. This must needs evacuate the spleen, and recover its tonic power, must accelerate the transition of the bile thro' the liver, scour all the abdominal glands, and rouse up its whole contents to their respective offices, whereby the first business of the œconomy, digestion is respected. Nevertheless this is to be done with caution and good advice, with regard to the strength of the party, the *stadium* of the distemper, and its most prevailing symptoms. For the hyſteric colic in particular is not to be cured by evacuating the redundant bile altogether by emetics, but by sending it the right way thro' its proper gland the liver. Hence opiates are the chief remedy which volatillize the blood, and obtund the painful stimulations of the bile upon the parts. Then warm bitters which concoct and thin the humors, strengthen the stomach, and assist the spleen to promote its natural passage thro' the hepatic glands. Certainly the vi. consequence of exsection of the spleen which I enumerated p. 28. fully proves my supposition, that the spleen assists the action of bile-making in the liver, not by slackning, but accelerating the motion of the blood in the *porta*. For if in animals where the spleen is lost, the liver is found thicker and larger than usual, and that it becomes perfectly dry like cork, and may be crumbled in pieces: 'tis a most undoubted argument, that it wanted the arterial fluice of the splenic blood, to scour out the biliose glands and canals, and dilute its hot and violent salts stagnating therein. The lack of this salutary exertion no doubt is most frequently the cause of jaundice, and many other maladies akin to that we are treating of; but this theory may be so copiously extended, that I fear even to touch upon it again.

VENÆSEC-
TION.

As it's necessary to lessen the quantity of the blood, to give room for the tension of the fibres to recover it self: so we find nature frequently by a critical discharge thereof in this case eases her self of the superfluous load, sometime by the nose, sometime by vomiting blood, pour'd into the stomach by the *vasa brevia*, sometime by a bloody flux, but oftner and best by the hæmorrhoidals, always most natural, and the salutary outlet from the spleen. The great *genius* of medicin *in coacis*, pronounces thus; they which have pains about the *præcordia* and mouth of the stomach, the liver and parts about the navel, are preserv'd by discharge of blood by the *anus*, not discharg'd they dye. Thus the kinsman of *Aristæus* in *Hipp.* and *Pericles* of *Abdera*, and *Antigenes* the *Perinthian*, were cur'd by a flux of blood from the left nostril, by a large sweating and thick urine. The like hæmorrhage freed *Bion*, *Scopus*, *Lycinus*, and the stranger in the garden of *Dealcis*. *Hechsteter* has frequently cur'd hyſterics by letting blood even tho' the *menſes* were flowing. *Higbmore* the same. Hence the common opinion among the ancients, and founded upon nature, (as apparent enough upon our premised communication between the hæmorrhoidal and splenic vessels) that the hæmorrhoidal veins purg'd the spleen, and leeches are apply'd to open them for that purpose, there being no more direct derivation from the spleen than this way, of great emolument to all melancholics, and in general to plethoric habits, and in

great distempers, especially the critical one of the internal hæmorrhoids. This is to be supply'd by blood-letting where it's not spontaneous, and rather to avoid the trouble and inconvenience that attends the other. *Hipp. Aphor.* vi. 11. says the hæmorrhoids coming upon those troubled with melancholic or nephritic ills, is good. *Aphor.* vi. and 21. he says *varices* or hæmorrhoids coming upon mad people solves the madness. *Gal. de v. f. advers.* *Erasistrat.* says, they live the most healthy who have the hæmorrhoids open. *Hipp. de humoribus* and vi. *de morb. popular.* declares, they which have the hæmorrhoids are in no danger of a pleurisy, peripneumony, *phagedena*, *furunculi* or tubercles. *Hildanus* adds leprosy, *vitiligo*, apoplexy, epilepsy, *vertigo*, or inflammation of the eyes. He gives many cases of the spleen cur'd this way. *Gal.* in 11. *aphor.* §. vi. affirms 'tis only on account of the evacuation. From every author we may learn, that melancholy and madness, affections of the spleen, reins, liver, mesentery, quartans, malignant ulcers, cancers, and all cutaneous distempers, almost all ills of the lungs, head, and in short of the whole body, arise from a redundancy of blood; and especially in mankind, according to an assumption we treated of before. For which reason provident nature has contriv'd to obviate this inconvenience, by making the spleen more large and curious in mankind than animals, and in the hæmorrhoids. Hence she is much more frequently redundant in many spleens than deficient in one, and hence the graduation thereof, for it is more considerable in more perfect animals. So *Aristot. de part animal.* iii. 7. says, only most perfect animals have the spleen. *Riolan* iv. says, those animals which have blood and have but little or no lungs want the spleen, or have a very small one, which most evidently points out to us, that this part regards the *regimen* of the mass of blood. Hence hæmorrhages of the nose a symptom of lienal obstructions, the blood regurgitating for want of room to retire into. *Hipp.* ii. *prædict.* n. 41. *Hipp.* and *Celsus* say, they that have great spleens are subject to hæmorrhages. Now as to the hæmorrhoids, the misfortune is that it's difficult to regulate their flux, being in so dependant a part, for they rarely are open, and when so, not easily clos'd again, and then they depauperate the whole mass by the excess: beside the great pain accompanying, which frequently produces other ills; as oedomatous swellings of the legs observ'd by *Hipp.* and other tabid symptoms. Whence *Hipp.* vi. *aphor.* 12. recommends one to be left running if the rest be stoppt. Here is likewise some difference between the internal and external, the former chiefly emptying the *plethora* of the *abdomen* or vessels of the *porta*, the other being deriv'd from the *cava* and great artery relate to the universal habit. The first by authors is said to have a more particular relation, and rightly, to what they call the *cacochymia*, or ill state of digestion according to our theory; the other to the common plenitude of the whole mass. Therefore a suppression of the internals is more dangerous, and their flux more beneficial, especially in our case, as more immediately derivative from the suffering parts, and it's rare for the external to flow, unless open'd by art. Now to procure this aloes is observ'd by all to have a most specific quality, and given in small quantities as an alterative; and *laudanum* too, which dissolves the blood excessively, and from its divine relief is so coveted by melancholics.

Urunt letheo perfusa papavera somno.

Virg.

Diuretics

DIURETICS. Diuretics are entitled to an eminent regard in hypochondriacism, being most powerful in fusing the blood and dissolving its concretions. *Hipp.* in the little book *de intern. affect.* says such medicines ought to be prescrib'd to lienose as purge by the bladder. In *extern. affect.* he orders diuretics to biliose who have a great spleen, and therefore of a bad color and contract malignant ulcers. In *coacis*, he tells us that in long wandering fevers, thin urine shows the spleen affected, and that tho' they spit much and make so much water, still he advises hydragogues, and a critical flux of urine proves salutary to them, as he several times inculcates. So *Bion* being splenetic was judg'd when he made much water, very clear, and bled at the left nostril, for his spleen was hard and swollen. He thinks the left vessels more particularly prove serviceable, as being on the same side with the spleen, and *Drelincourt* strenuously defends this sentiment. The left side of the body no doubt is most excellent, and an argument of the excellence of the spleen may thence be drawn, for on that side is the major part of the heart and more excellent part, the left auricle and ventricle, on that side is the gullet, *aorta*, spleen, thoracic duct, stomach, *pancreas*, *colon*, and a larger quantity of nerves, and it's observ'd the *epiploon* descends lower on that side. *Galen* shows numerous instances of the good effect of this evacuation by the bladder in this disease, as in *Herophon*, *Nicodemus*, *Meto*, *Heropythus*, in the wife of *Epicrates*, &c. He says especially the kindred malady of a stoppage of the *menfes* was freed by a large profusion of black urine. This he had from *Erasistratus*. In his comments on vi. *Epidem.* he has shown this is a sign of a colliquated spleen as he calls it. *Avicen.* xv. 3. says when lienose exercise themselves much, the melancholic humor is deriv'd to the urinary passages, and black water is made. *Laurentius* vi. *quaestion.* 26. observ'd many lienose cur'd by a large quantity of such. *Valerius in exercitat.* ad c. 40. *Hollerii*, speaks of a religious who three or four times in the year, especially spring and autumn, had his spleen swell'd with pain in the left hypochondre, and all over his body became surlivid like black jaundice, at length for five or seven days making much blackish water he recover'd, and this happen'd constantly for fifteen years together. 'Tis an undoubted proof that men raise a *plethora* within the space of a month as well as women, because *Sanctorius* has observ'd they constantly weigh heavier once in that space, and by some critical evacuation of urine or the like return to their former state. The more volatile these and all other splenic remedies the better, as the more attenuating and brisk about their work. And in this sense is it best understood why acid things are said by authors to be friendly to the spleen, such as pickles in particular, because they dissolve and thin the consistence of the blood in splenetics and promote urine, *Hippocrates* gives even vinegar. And *Celsus* orders a *malagma* for the spleen temper'd with the sharpest vinegar.

STOOL. As to the fourth way of cure directed by *Hipp.* we must observe there are two *stadia* in this distemper; the first a superabundant moisture, which is the beginning and progress thereof; the other a dry, earthy, saline and fix'd state of the blood; which is approaching to that of madness. In the first brisk purgers must be us'd that fetch out the *serum*, such as jalap. Now the advice of *Hipp. Aph.* iv. is applicable, where he orders melancholics to be purg'd violently with such things as being small in quantity work much. Nor need we be afraid, when even a short dysentery has cur'd the spleen in *Hipp.* *Celsus* ii. 3. *Aponens. diff.* 101. *M. de gradibus*, *Heurnius*

nus t. ii. In the latter case as to laxatives they must be of a much gentler class, and much preparation made for them by a diluting course of diet. Cyder is very good, and Spaw waters now claim their place, especially the chalybeate, which open the urinary passages, disunite the feculent accretions of the blood, and by their stypticity constringe and strengthen the tonic disposition of the fibres, beside the great heat procur'd therefrom and many other advantages, when they are judicially administred, by such as understand their *rationale*. Moreover by frequenting these places not a little benefit is to be expected from the company, variety of life, conversation, exercise, air, and mind disembarass'd from cares and business, the music, balls, and other entertainments. The ladies tea-table now is seasonable. And in food all moistning *regimen*, such as cichory, parsnips, *asparagus*, carrots, figs, almonds, raisins, and your horary fruits. *Hipp.* and *Mesue* advise asses milk.

The theory of all this, which is easily apprehended by a *tyro* in medicine, shows that sudorifics are very useful at first, especially after exercise, or upon rubbing the skin with a flesh-brush. Issues likewise are commendable. Bath-waters must necessarily spirit up the blood, but care must be taken not to increase or produce an inflammation. I judge pumping upon the spleen an improvement and good *succedaneum* to the methods of the ancients, such as burning it, or fomenting it with hot decoctions of *aqua calcis* and herbs, or beating it with sticks in order to reduce it and oblige it to contract its self. The *cortex peruvianus* is recommended with great reason by *Sydenham*. If it cures fevers by thinning the blood, by new bracing up the fibrous system with its astringency, and by opening insensible perspiration; it answers every intention in the case before us, especially if the fits return, as frequently, at stated periods. Steel and sulphur had better be repeated than not inculcated as a sacred anchor. I have only one hint to add, whence an easy calculation may be guess'd at, of the extent of the power of the spleen. And that is deducible from the analogy I have several times mention'd between it and an external part of the body subject to like variety of extension, which ordinarily and generally at a *medium* in its different states admits of this difference in its bulk or quantity of blood introduc'd into its cells, *viz.* 17, 86: 2, 55. this if transferr'd to the spleen, which I think may very reasonably be suppos'd, is sufficient to answer fully the utmost powers and faculties I have any where assign'd it.

Having chalk'd out some general methods and most powerful remedies, I shall detain you no longer. As for particular and innumerable applications and administrations, with their reasons and deductions and the like, I refer to authors who have wrote largely upon the subject, such as *Higmore*, *Sydenham*, *Purcel* and others, whose practice, whether designedly or no, manifestly glances towards the theory we have been explaining. As I speak to the experienced in the faculty, there is no occasion in the curative part at this time for the length and exactness of a regular treatise. I have endeavor'd to mention what seems sufficient to open and confirm my opinion. which I entirely submit to the most acute judgment and equal candor of this learned auditory, with all the possible resignation that becomes a free physical enquiry.

RESTAT adhuc, Auditores humanissimi, ut veniam mihi indulgeat patientia-vestra tamdiu suspensa. & quidnam dubitemus a viris doctis &
Y
omni

omni scientiarum genere imbutis; quorum proprium est tam candore & benevolentia omnes antecellere, quam præceptis institutisque philosophiæ abundare? Arduum sane opus & siquid aliud difficilimum tentasse non pœnituit, cui aures præbere faciles & amicas dignentur Machaoniæ artis Principes. Non desperandum est etsi in hac palæstra tot egregii & magni nominis viri, oleum & laborem, ne dum nudam veritatem adepti insumpserunt. In causa veritatis omnibus perorare licet & in convivio philosophico non omnino a symbolos esse. In problemate maxime nodoso certasse tantum sat gloriæ æstimandum est. Vobis quidem viri ornatissimi, ex jure deferunt Apollinei cætus affecta tentamina sua, ad extendendos medicæ scientiæ terminos, ad ornandas naturæ sapientis provincias, unde morborum theoria & curationes luminis aliquid mutuantur. Auspiciis vestris excitatum, quem non capiat æmulus benemerendi ardor? qui tam præclara ingenii & eruditionis specimina ex hoc subsellio edidistis, qui artem propriam ad celsissimum dignitatis gradum adeo longe reipublicæ utilem evexistis. Domus hujusce columnæ stantes & lumina ingentia! Nec dubitandum est quin sodalitium vestrum mereri pergat maximorum principum favorem, qui nunc & olim maximos honores & privilegia in idem contulerunt. Cui se non dedignatus est adscribere Britannicæ nobilitatis flos: cui nec inter minimos aut laudis aut honoris titulos visum est se collegio regali medicorum socium adjunxisse. Expergisci profecto videtur & in lucem redire antiquus hujus loci genius. An Harvæi manes ingentes, an Caji an Linacri spiritus immortales, relictæ sede beatorum, ædes dilectas iterum revisunt? Me fallit amabilis insania, ni priscam virtutem & energiam resumpsimus, atque sæcla denuo Saturnia expectamus. præsertim sub illustrissimo & spectatissimo præside, qui ad omnes avorum nostrorum dotes præclarissimas, etiam addidit suas. Cui summus ni pectoribus naturalis scientiæ promovendæ incoctus amor, cui nec mens nec vires desunt, artem divinam ad pristinum nitorem restituendi. virum equidem nostri encomii haud indigum suspicit orbis eruditus, & laudes ejus absentis prædicantur, quas coram innuere rudis est & injuriosi.

Taceo indefessam ejus diligentiam & acumen in libris undique conquiendis, qui ad classem Hippocraticam pertinent: quoniam ipse omnibus bibliothecis longe & instructior & vivens Palatina. Taceo pinaco thecam historiæ naturalis tam varietate & copia quam ordine & methodo admirabilem omnino; nisi ipse Plinius alter & alter Hippocrates, & totam naturam perlegit & in usum salutemque humani generis administret; aut veluti sol oculus mundi divitias suas, sc. quicquid habet uterque polus, largitur, intelligit, illustrat.

Nec minus collegis universis gratulor tanti præsidis sequacibus, qui symbolis collatis tam lubenter ædes hæc & medicæam restituerunt rem. per quorum industriam & assiduas curas, exploratis medicamentorum genuinis viribus & præparatione caveatur: ut nebulones larvatici civium sanguinem & crumenam sitientes foris ablegentur. Vos quidem curru triumphali cernimus quotidie velut Capitolium ascendentes, morborum acies hostiles proculcare. Vos Pythonis domitores, mortisque profligatores. Quam jucundo ore omnes vos aspiciunt, vitam pretiosissimum omnium bonorum divina manu largientes. Vos posterì laude immortalì remunerent, quibus in progenitorum salute, sua debetur, & ad cælum usque prædicabunt, humani generis præsidium & dulce decus.

EXPLICA-

Explication of TABLE I. of the SPLEEN.

AA. Arteriæ hepaticæ. a. umbilicalis. BB. phrenicæ. b. solitaria. CC. cysticæ gemellæ. D. pylorica. dd. epiploici rami anteriores dextri. E. gastro epiplois dextra. ee. gastrici rami anteriores dextri. F. intestinalis ad duodenum & jejuni principium. f. ramulus ad pancreas. G. arteria cæliaca. g. splenica. H. ad dextram inferioris omenti & colon, epiploo-colica dextra posterior. I. gastrica dextra posterior. K. pancreatica. L. ad mediam inferioris omenti & colon, epiploo-colica media. M. epiploo-colica sinistra. N. gastro epiplois sinistra. nn. rami gastrici sinistri anteriores. O. gastrica posterior. oo. rami epiploici sinistri anteriores. P. gastrica major. pp. ad dorsum ventriculi. QQ. gastricæ posteriores minores sinistrae. q. Coronaria. R. splenicæ rami superior & inferior lienem intrantes. r. anastomosis cum vena splenica. S. vas breve. T. hæmorrhoidalis splenicæ, externa. tt. renales sive emulgentes abscissæ. V. hæmorrhoidalis aortæ interna. W. mesenterica superior. X. mesentericæ ramus ad ileum. Y. sacra. ZZ. vertebrales. &. spermatica sinistra.

TABLE II.

AAA. Venæ portæ origo in hepate. a. umbilicalis. BB. phrenicæ. CC. cysticæ gemellæ. D. pylorica posterior. dd. epiploici rami anteriores dextri. E. gastro epiplois dextra. ee. gastrici rami anteriores dextri. F. a duodeno & jejuni principio, intestinalis. f. ramuli a pancreate. G. splenica. H. a dextra inferioris omenti & colo epiploo-colica posterior dextra. I. a posteriori & dextro ventriculi fundo absque arteria, gastrica posterior dextra. K. pancreatica. L. a media inferioris omento & colo, epiploo-colica inferior media. M. a sinistra inferioris omenti epiploo-colica sinistra. N. gastro-epiplois sinistra. nn. gastricæ sinistrae anteriores ramuli. O. gastrica posterior. oo. gastrici dextri anteriores ramuli. P. gastrica major. pp. a dorso ventriculi. Q. gastricæ posteriores, minores, sinistrae. q. coronaria. R. splenicæ rami lienem intrantes inferior & superior. r. anastomosis cum arteria splenica. S. vas breve. T. hæmorrhoidalis a splenica, externa. V. hæmorrhoidalis portæ s. interna. W. mesentericæ s. mesaraicæ. X. mesentericæ ramus ab ileo.

TABLE III.

An ox's spleen prepar'd, the arteries injected with wax by Mr. Symonds. Here the upper coat is intirely cut off to show its internal texture, and a section of the splenic vein taken away.

A. the larger splenic artery penetrating thro' the side of the splenic vein, and running along the middle of its main channel in the substance of the spleen, like one pipe within another. Its ramifications are obvious, percing every where thro' the vein and dispersing themselves thro'out the whole, to the verge of the spleen.

a. is the lesser splenic artery, alike piercing thro' the vein but a little lower. This runs across the main trunk of the splenic vein, and enters, after a divarica-

divarication into two, a like branch of the vein, and then disperses it self at the bottom of the spleen as the former, thro' the main of its substance.

B. the splenic vein, which becomes a large *capsula* to the arteries. Its punctures and perforations are conspicuous all along which open into the circumjacent cells. Sometime it's observable the artery dips thro' it, and emerges again, as at the letter b, and other places.

The rest of the substance of the spleen is made of arteries and fibres, which leave the infinity of cells between them all opening one into another.

c. shows a bit of the external smooth surface of the spleen.

T A B. IV.

Fig. I. the human spleen.

Fig. II. the spleen of a wild goat. both prepar'd by Mr. *Nat. Smith* lately deceas'd.

Fig. III. the spleen of a child.

Fig. IV. the spleen of a sheep. both prepar'd by Mr. *Joshua Symonds*.

In all these figures a. signifies the splenic artery, b. the vein upon which the nerves run, and must be supply'd by imagination, rather than preparation or figures; the rest are the fibrous columns and cells.

Fig. V. is a diagram to explain the manner of water-works thus, A. is the place where the power of the forcing engine is apply'd, continually driving the water into the pipes, represented by the canal A B. B. is the end of the pipes in the city or place to be supply'd with water. C. is the cistern or pond, or reservoir upon an elevated place, that continually receives what is not evacuated at B.

T A B. V.

Represents a vertical section of the human body thro' the middle of the scull and whole length of the spine, in order to show the propagation of the nerves, particularly the *par vagum* and left intercostal.

a. The skin of the *cranium*. b. the *cranium*. c. the *falx*. dd. the *sinus's* or veins thereof. ee. the vessels spread upon the *meninx*, lining the inside of the scull. f. the spongy bones of the nose. g. the place of the *cerebrum*. h. the place of the *cerebellum*. i. the origin of the *par primum* or olfactory nerves. 2. the optics or second pair. 3. the mover of the eyes or third pair. 4. the pathetic of the eyes or fourth pair. 5. the fifth pair going to the eyes, face, nose, palate, forehead, upper and lower jaws. From it arises one branch of the intercostal nerve. 6. the sixth pair going to the eyes; from whence another branch of the intercostal arises. 7. 8. 9. 10. denote the other pairs.

i. is the eighth pair or *par vagum*, transmitted thro' the lower part of the scull, and making immediately the *plexus ganglioformis superior*. Thence we trace its dispersion upon the heart, lungs, gullet, stomach, *pleura*, *mediastinum* or whole contents of the *thorax*; passing thro' the diaphragm, it encompasses the body of the stomach with numerous branches, and from thence sends many twigs to the lienar *plexus's*.

k. is the spinal marrow cut off from the *cerebellum*, and passing down the whole length of the spine.

I. is

l. is the left intercostal nerve let thro' the lower part of the scull, and making immediately the *plexus ganglioformis superior intercostalis*, from whence goes a communicating branch to the ganglioform *plexus* of the *par vagum*; others to the *sphincter* of the throat; another to the heart. Going downwards it forms the middle or cervical *plexus* m. sending by the way several communicating branches to the *par vagum*. Then it ties a rope about the axillary artery n. and immediately forms the inferior intercostal thoracic *plexus* o. it receives all this way a branch from the spinal marrow at every joint of the spine mark'd pp. and sends out likewise branches mark'd qq. to the arms. It must likewise be noted that from the middle *plexus* it sends an eminent branch into the recurrent of the *par vagum* upon the *gula* and windpipe mark'd rr.

After this the intercostal descends the *thorax*, but dividing it self into two bodies; and passes the diaphragm directly to the spleen, where it forms the great lienar *plexus*, whence many communicating branches to the stomach. Its various communications from hence with all the mesenteric and other *plexus's* of the whole *abdomen*, and its entry into the spleen, and what is further necessary on this head, is explain'd in the discourse and delineated in the scheme, as much as the nature of the thing will bear, but is more largely illustrated in writers upon the parts.

f. shows the tongue. s. the *cartilago scutiformis*. t. the windpipe. u. the heart. w. the passage of the windpipe into the left lobe of the lungs cut off. x. the origin of the great artery from the left ventricle of the heart. y. the descending trunk of the great artery. z. the carotid artery going up to the head, cut off. &. the gullet.

A. the ascending trunk of the *vena cava* going to the right auricle of the heart. B. the left auricle of the heart. C. the *mediastinum*. D. the diaphragm. E. the stomach. F. the *pancreas*. G. the *intestinum duodenum*. H. the spleen. I. the small guts. K. the left kidney. L. the *colon*. M. the great artery and vein branching out to the iliacs. N. the bladder. O. the *intestinum rectum*. P. the spermatic vessels. Q. the *ureter*. R. the *os pubis*. S. the testicle. TT. the nerves that go to the leg.

T A B. VI.

Shows the *viscera* in the *abdomen* of a dog, disposed chiefly with an intent, that the communication of the spleen therewith may be more evident. The vessels are easily understood from the first and second schemes; what references are necessary follow. A. the upper fold of the *omentum* elevated. B. the stomach turn'd upwards. C. the *pylorus*. D. the *duodenum*. E. the gall-bladder. F. the liver. GG. the *pancreas*. H. the spleen. iiii. its numerous *vasa brevia* to the stomach. K. the splenic artery. L. the splenic vein. M. the greater gastric veins and arteries. N. the veins and arteries call'd *gastro-epiploicae sinistrae*. O. the *gastro-epiploicae dextrae*. P. the *vena porta*. Q. the ascending trunk of the great vein. R. the descending trunk of the great artery. SS. the kidneys. T. the *intestinum caecum*. VV. the *ilia* or small guts. W. the *colon*. X. the *rectum*. Y. the veins and arteries thereof. ZZ. the *ureters* cut off.

T A B. VII.

Shows the abdominal *viscera* in a man, so dispos'd as to illustrate the communication between them and the spleen; the names of the vessels are easily known from the first and second tables.

A. the gullet. B. the upper fold of the *omentum* turn'd up. C. the stomach turn'd upwards. DD. the liver. E. the gall-bladder. F. the great artery. G. the great vein. H. the *vena porta*. I. the splenic artery. K. the splenic vein. L. the spleen. M. the *pancreas*. N. the *pylorus*. O. the *cæcum*. PP. the small guts. Q. the *colon*. R. the lower fold of the *omentum*. S. the *rectum*. T. the *sphincter ani*. V. the external hæmorrhoidal vessels. W. the internal. XX. the *iliac* veins and arteries. Y. the mesenteric vessels. Z. the emulgent. &&. the spermatics.

T A B. VIII.

Shows a large spleen human, found in a man last dissected at the college, drawn in its exact bulk. A. the splenic artery. B. the splenic vein. CC. vessels going to the hæmorrhoidals. D. vessels going to the *pancreas*. E. the *vasa brevia*. F. the nerves.



ELENCHUS SPLENIS.

| | |
|---|--------------------|
| Opinion of the ancients, that it is the purifier of melancholy and seat of mirth | Pag. 2. 25. 72. |
| human larger, largest in a woman | 7. |
| frequently numerous, seldom deficient | 5. 6. |
| the human (above bestial) has more numerous and larger blood-vessels and nerves, | } 9. 13. 23. |
| they enter the spleen in more and distant parts | |
| 'tis more carefully suspended | 5. |
| has stronger extremities of the vessels | 17. |
| its substance more compact, of more oporose structure, more constant figure, shorter, broader, thicker, &c. | } 5. 6. 7. 8. 79. |
| more particularly affix'd to the diaphragm, than in brutes | |
| its vessels larger, and coats thicker than those of the liver | 57. |
| its most safe and retired situation | 2. 8. 12. |
| its cellular texture | 5. 29. |
| 'tis chiefly arterial | 9. 10. 16. |
| the rest of its composition fibrous muscular columns | 12. 16. 17. 24. |
| its arteries extraordinary large, numerous, long and contorted | 17. 43. |
| its communication with all the abdominal parts | 12. 13. 46. |
| more especially fix'd to the stomach | 9. 22. 29. |
| its nerves extraordinary | 4. 5. 32. 7. |
| more especially communicating with those of the stomach | 23. 24. 21. |
| its coats very nervous | 22. 32. |
| its excision consider'd and suspected | 10. 24. |
| the history of that operation | 25. |
| the consequences thereof | 27. |
| the spleen is not a gland | 28. |
| has no acid juice | 18. 29. 19. 24. |
| its lymphatics | 45. |
| From all the foregoing particulars its excellence is infer'd, and its uses | } 30. |
| hinted at | |
| The purpose of the spleen. 'Tis an animal sponge | 5. 24. 29. 38. 48. |
| a reservoir of pure and thin blood | 64. 80. |
| even its venal blood thin | 19. 23. |
| 'tis a protracted or contorted artery or arterial <i>cista</i> | } 46. 25. 35. 42. |
| its muscular force | |
| 'tis a muscular artery or arterial muscle | 30. 60. 72. |
| has a proper pulse | 48. 72. |
| has a power of contraction and relaxation | 16. 46. |
| prov'd from its nerves, from the admission of them, and of its vessels and their | } 42. 47. 20. |
| <i>involucrum</i> | |
| from their horizontal support | 46. 47. |
| from the <i>vas breve arteriosum</i> | 12. 43. |
| from the muscular coat of the spleen | 20. 21. 42. |
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| somewhat like that of the <i>penis</i> | 9. 19. 20. 43. 72. |
| its ordinary quantity of blood a pound | 37. 42. |
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| blood-vessels and nerves | |
| 'tis a magazine of blood to the stomach | 33. 35. 76. |
| 'tis as a heart to the stomach | 43. 37. |
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January 1722.

A N

ESSAY

TOWARDS THE

ANATOMY of the ELEPHANT,

From one DISSECTED at

Fort St. George Oct. 1715, *and another at*
London Oct. 1720.



THE great uses of comparative anatomy are so glaring and manifest, that nothing need be said to recommend it. This consists in observing the admirable and various methods of nature, in the structure of different animals, correspondent to their bulk, figure, place, manner of subsistence and the like. And we may be assur'd the pleasure that attends the curiosity of such as love these enquiries, will be a perpetual incentive to the industry of all ages, in searching out the inexhaustible fund of wonders in a living creature. We need not insist upon the great light arising therefrom, towards explaining difficult points in our own œconomy, as well by inspection, as plain reasoning and inferences from one to the other: such dissections mutually illustrating one another, as will in some instances be clear from the ensuing discourse. The common and all-wise founder chuses in different manners to compass the same ends, sometime as it were by necessity, sometime by choice, the more to demonstrate the magnificence of his power, and captivate our attention to the harmony of his works, which like musick consists in a most beautiful and concordant variety. Comparative anatomy is the metaphorical oratory of nature, a divine sermon, where she explains her purposes by pleasing circumlocutions, and a redundancy of invention, that strikes us with inconceivable ravishment.

But more especially may we expect improvement in our art, by searching into the entrails of so prodigious a creature as the elephant; the hugest of all that tread the ground, a mountain of animated matter. Where little and necessary particularities, escaping our sight in most others, are spread out in *folio* and present themselves to our naked eye in full view; which often in others we are apt to pass over without so strict a scrutiny, or at least by common vision cannot possibly come at: where the springs and wheels of life, as we may not improperly call them, are expanded and enlarged,

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which adds much to the delight as well as profit of the work, so vast a machine requiring a more extraordinary workmanship in its composition, than other minute, and for that reason call'd, imperfect animals. For if there be a certain *terminus* in the atoms or first particles of substance, as we may gather from Sir *Isaac Newton's* optics, so that its powers have an extent beyond which they cannot well go; then is it reasonably to be suppos'd, that their combinations and effects have somewhat different turns, as to the action and composition of animalcules, in respect of the larger loco-motive productions of the creation. Even as the last-mention'd great man has just suspicions, and very far demonstrated that the laws to which matter is subjected, exert themselves in parts extremely small and near to one another, not in the same manner, as in the immense and distant collections of the planetary bodies.

The rarity of this creature and opportunities of dissecting it, as well as the scantiness of what has hitherto been printed upon its anatomy, will sufficiently apologize for the present editor, if he pretend; to no more than adding somewhat material to the account, in a short rehearsal of the parts, especially such as most considerably vary from others. For it is not to be expected that a compleat natural history of it, can possibly be gather'd from one or two instances. They that are conversant in these affairs will readily own, how far distant we are from such a pretence, even in the human body, after the labors of so many ages, and infinite subjects employ'd in that purpose. How great are the improvements we boast of since *Galen's* time, yet how rich a harvest remains for the glory of future times?

But we thought our selves indispensably oblig'd to communicate what is here observ'd, by which means only, there is hope in time, to have a compleat description thereof, from the sum of what has been and may be publish'd. The only excuse we can make to those, who possibly may expect a larger volume, is founded on the wetness of the season which then happen'd, whereby it was impracticable to dwell on the parts and examine them with due accuracy and attention in the open air. For which reason it's very much to be wish'd, some public place was provided, convenient for such dissections and other extraordinary occasions of this nature. However if the gentlemen that have already published the result of their disquisitions in this sort, under the same or like disadvantages, merit the thanks of the public; it is hoped this imperfect addition to their store, will not be blameable or impertinent. Yet the learned world ought to be acquainted that whatever is found worth perusal in these papers, is entirely owing to the care and cost of Sir *Hans Sloan*, whose unweary'd application in promoting useful knowledge is as extensive as the field of nature. He furnished us with the opportunity of the present administration, and moreover obtain'd an account of another dissection of this creature, made at fort *St. George* in the month of *October* 1715, (which was much larger than ours, viz. in height 7 or 8 cubits, i. e. a foot and half *French* measure, which is somewhat more than ours) open'd and describ'd by *monsieur Suply* surgeon there, in a letter written to the chief surgeon of fort *St. David* in the east *Indies*. The method therefore we shall take in the following pages, will be to incorporate both histories, as far as is consistent, and except where they differ in any particulars worth mentioning; but the general measures of the parts are given from the biggest.

The elephant we dissected was lately brought into *England* from *Ben-colen*, our east *India* company's factory, and exhibited for a public spectacle. Somewhat less than three years old, and about six or seven foot high. It dy'd, as we may reasonably suppose, for want of a suitable and proportionate method of food, and from the ignorance of the keepers, who expos'd it to cold and moisture, by stabling it in a damp booth and wet floor, not agreeable to its nature and the hot country it came from. Beside, it was upon cutting its great teeth or tusks, one being observ'd just broke forth. It's likely this pain, which was discernible from the creature's continual rubbing of the part, brought on a fever as is usual on such occasion. Its perspiration no doubt was stop'd from the cold taken, and it had no stools for several days, which is a distemper these creatures are naturally subject to. All these disorders we may well suppose heightned by the great quantity of ale the spectators continually gave it. After it had languish'd for some time, by the advice of a farrier several very strong purges and glisters were used; they not passing, it dy'd on the 4th of *October* 1720.

As to its external shape, it cannot be describ'd with greater accuracy and simplicity, than in that famous old author and greek physician *Aretæus Cappadox* lib. ii. *de causis morb.* cap. 13. a translation of which we judge not unacceptable to the reader. "The head and face of the creature is
" ugly, and indistinctly join'd to its short neck, so that it seems as if fix'd
" upon its shoulders. The ears are very large and broad like wings, reach-
" ing down to its throat and *sternum*, whereby its neck and shoulders are
" cover'd, like a ship with its sails. Its horns, otherwise called teeth, are
" extremely white, exceeding every thing of that color in any other crea-
" ture. These are plac'd not on the forehead and temples, as is usual in
" cornigerous animals, but in the mouth and upper jaws; looking upwards,
" not strait but turn'd a little forwards, upon whose convexity they are a-
" ble to carry a weight. They are very large, of the length of a cubit or-
" dinarily, some much longer. From the upper jaw goes a large promi-
" nence, arising at the upper lip, 'tis long, without bone, flexible like a
" serpent. At the end of this are two openings, which nature has bored
" quite thro' to its lungs like a double pipe. The creature uses this canal
" as a nose to breath withal, and likewise as a hand, for it can take up a cup
" at pleasure with this process, and hold it fast very strongly, nor can any
" thing else but a stronger elephant take it away. Grass is its food, for it
" can't eat flesh. Its long feet bearing the creature a good height from the
" ground, and its neck, as we said, being short, it cannot eat from the
" earth with its mouth. Nor can it drink out of a river therewith for the
" same reason; and in some measure its trunk hinders those purposes.
" With this it takes its food, and can lift up a great weight. Rightly
" therefore the ancients call'd it *proboscis*, because it seems to eat with it
" before its mouth. When it thirsts it immerses the end of the trunk,
" then breathing, instead of air draws up water in large quantity. When
" he has fill'd his nose as a cup, he pours it into his mouth with a stream
" like a river; afterwards draws again and pours it out again, till he has
" fill'd his belly like a ship. His skin is rough and very thick, rais'd un-
" equally with long tracks of deep fissures, some in strait lines, some crof-
" sing one another, like the furrows of a plow'd field. As other creatures
" have hairs or bristles, the elephant has only a sort of down. There are
" infinite other differences between this and other animals; as that he
" bends

“ bends the knee of his hinder leg like a man, and has breasts near the arms like women.”

Thus far this most accurate author, to whose description little need be added. It's generally allow'd to be somewhat of the hog kind, its snout being wonderfully extended into what they commonly call the trunk, or trumpet more properly, which so remarkably distinguishes it from others, and where nature's contrivance is so admirable, in this bulky, unwieldy, and otherwise helpless creature, which perfectly supplies the use of hands given to the human *species*, and its similar representatives of the monkey kind. The end of the trunk, tho' apparently like a hog's, is of an exquisite sense and action; there is a little protuberance in its upper part, which it can use as a man does his fingers, and take up the smallest piece of money or the like, and do a thousand feats learnt it by the keepers; as firing of a gun, beating a drum, throwing a javelin, &c. to entertain the spectators. It can bend this instrument upwards, downwards, backwards or sideways, to any part of its body. Whence very aptly by *Lucretius* l. 2. are they call'd *anguimano*s. *Pliny* sometime terms it the hand. *Spirant & bibunt, odoranturque haud improprie appellata manu.* viii. 10. By *Schotto*, *manus nasuta*. l. 8. *mirab. animal. terrest.* 'Tis ordinarily seven foot long or more, proportionable to its height, seeing it must of necessity nearly reach the ground. With this it takes up its food, which is generally grass, or roots of herbs or boughs of trees, which its height and strength enables it to pull and break off, hanging with its whole weight thereon if need be; so that this way they will depopulate whole woods, as far as they can reach. It is very diverting to see the creature eat, and observe how well it knows to use these peculiar members; how dexterous it is in the management of them. The leaves and herbs it rolls up into a bundle, after it has shak'd them from dust and insects, as a man does a salad, wherein it is very nice and delicate: then bending the trunk into a circular form, lodges them in his mouth. It's said, if you mix sand or dirt with barley, which it loves very well, it will separate the grain very notably from the impurities before it eats. They love melons and the like fruits exceedingly, and can smell them at a vast distance, as the learned *Hermolaus* says in his commentaries on *Dioscorides*. When it has no other food, it digs up roots, either with its trunk or teeth, and uses both too in cutting down and destroying trees. *Strabo* reports it will raise it self on its hinder legs to pluck down the arm of a tree, or to demolish fences or whatever stands in its way; and in such kind of work it has more than the strength of twenty four men. It pulls up palm-trees whole, and eats the fruit. 'Tis known they can carry twenty men in a tower upon their backs in time of war. When they go thro' deep water and in danger of sinking they stretch out their trunk above water to breath thro'; so provident is the Creator, who not only has given the creatures wonderful organs, but likewise taught them all their uses. The largest of these (as by the *Indians* accounted) royal animals, are in the east *Indies*, and generally of a whitish color or russet. Those in *Africa* are less and of a darker complexion. The utmost height we read of is about nine cubits or fourteen foot. It's remarkable that the proportional length of the elephant is less than that of others, for 'tis generally equal to its height. How well is the cube apply'd for strength! They are gregarious and never found but in herds, and are said to live to two hundred years. Dr. *Strachan*, *phil. transf.* n^o 277. says, one sort of the elephants are

much higher before than behind. It's observable the fore legs are longer and larger than the hinder, contrary to other quadrupeds. The legs for a good height are much of an equal thickness and cylindric like the shaft of a pillar. The bottom of the foot is as round as a horse's hoof, and seems a composition of nature's, between that and the divided toes of other creatures: and each nail of the toes is like a small hoof. Its legs and feet have as many joints as other animals as to the *skeleton*, but towards the bottom outwardly end like the basis of a column in a flat, circular, horny sole, where in the fore part four flat nails come from the toes, with but very obscure divisions. A multiplicity of strong muscles implanted into every bone of the *tarsus* and *metatarsus*, which are nearer the ground than in other creatures, form it into a round, thick shape, like a jack-boot with the fore part of the foot cut off. The sole is not so hard but that it adapts its self to the plain it treads on, which no doubt is facilitated by those muscles. It's surprizing in the *skeleton* to observe, according to *monsieur Suply*, the bone of the *tibia* in the leg outward and the *fibula* inward, contrary to the manner of other creatures: the meaning of which can be only for greater strength like buttresses to a building. It lies down upon the ground to sleep, and raises it self again upon its knees, tho' not without some labor. This the keepers affirm'd of our young one, but the full-grown probably seldom lie down. It can walk three or four miles an hour with ease. The toes in our judgment are like those of a tortoise, having 5 nails on its fore feet and but four on the hinder. Ours being a female had two nipples upon the *sternum*, nearly between its forelegs, which are common to both sexes, if *Aristotle* be not misinform'd. The *pudendum* was placed more than ordinarily forward, between its hinder legs, upon the *abdomen* towards the navel. Its tail long and slender like a pig's, but hanging downright with a few hairs on the end. Its eyes are of a red color and very small, like a pig's, as *Vartoman* compares 'em. Ears large and flat lying close to the neck, like great pieces of leather, or bat's wings. Its mouth very small, tongue sharp towards the end, and flattish in a plane perpendicular to the horizon. All its teeth are grinders, eight in number, four in each jaw, two on a side, but large and arising from many roots; for cutting teeth are useless, seeing it breaks off the herbs with its trunk as a man with his hand. It has a blustering kind of voice with its mouth, call'd *barrus* in *latin*, a roaring, but the sound of its trunk imitates a trumpet of a deep note.

The skin of this creature is thick, wrinkled and furrow'd into ridges and cavities, some proceeding side by side, others intersecting them at right angles or obliquely, very much like the corrected comparison of *Aretæus* his plow'd field; it has but few scatter'd hairs on it, and of a russet color. We have observed that the skin of whales is channel'd, much after the same manner, nature using a like method in creatures of like enormity. It has a power of vellicating or contracting it, whereby it kills the flies and other troublesome animalcules by intercepting them between its wrinkles, or at least shakes them off. By feeling upon the *abdomen* we discern'd a large *scutum* as if it had been of bone, which guarded the whole compass of the belly. This upon dissection we found to be only a broad and thick body of hard fat. It's probable, 'twas part of that tough and thick membrane Dr. *Moulins* speaks of, consisting of fibres which descended obliquely, from the *spina dorsæ* to the *linea alba*, and doubtless design'd to support the great

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weight

weight of the *viscera* in the *abdomen*; and not without reason, for we found all the abdominal muscles very thin in respect to what we might well hope to have seen, and in proportion to the contents to be suspended thereby, and to the use of them; wanting in the extrusion of the excrements, out of guts of so prodigious a size. After these with the *peritoneum* were remoy'd, which was not without a good deal of labor, we had the appearance delineated in Tab. II. Fig. II. where it's to be observ'd the *omentum* did not cover all the guts as usual, nor was it cover'd with fat as others, but so exceedingly fine and thin that we might well compare it to gawse or a spider's web, and that twelve foot long and almost as broad. A texture so amazingly delicate that it highly deserves the name of *rete mirabile*. And certainly nothing in the world can be imagin'd so curious and surprising. Sprinkled all over with an infinite number of veins and arteries, which with perpetual *anastomoses* and minutest ramifications communicate one into another, and all seeming to float in the air by reason of the extreme delicacy of the membrane that holds them together. Some of their principal trunks were as big as one's finger. These are all along, thro'out the whole surface, encompass'd and accompany'd with the branchings of the adipose vessels, every where arising in this thin, lace-like membrane, and uniting by degrees into larger canals, as other vessels, till they convey their juices either into the veins or arteries. One of these intire was shown before the royal society, sent by *monsieur Suply* perfectly devoid of fat. That which Dr. *Blair* dissected in *Scotland* had no *omentum* at all, and was very lean thro'out his whole body, laboring as I suppose under a *pthisis*, the same was true of both ours, which seem'd therefore going into the same distemper. For we ought not to imagine them in a natural state, tho' the *scutum* of fat before mention'd would in a great measure execute one of the offices of the *omentum*, in keeping the guts warm and slippery, and defending them from immediate injuries of the cold, to which such membranous and exsanguious parts are ever liable.

One may wonder how so thick a fluid as the fat can circulate in such curious pipes, as doubtless it does, we imagine somewhat like the juice or sap in the leaves of plants. Certainly this must be assisted by the continual motion of the abdominal muscles, *diaphragm* and peristaltic oscillation of the guts themselves. But could the blood-vessels here be injected with wax of two colors different from the adipose, it would beyond dispute be the finest preparation in the world. A piece of this *omentum* is delineated Tab. IV. Fig. I. as well as graving can imitate so extraordinary an expansion, from the original pieces, prepar'd by *monsieur Suply*, and stretched upon paper, which are beautiful beyond imagination. It cannot seem improbable that there are small glands, which separate this oily matter from the blood, to be repositied in these membranous sacks, as in a store-house, and return'd into the mass again upon occasion. It is worth the while of the curious in anatomy, to search for the manner and conveyances. Till when, give us leave to hint at some of its uses. We mention'd its guarding the guts from cold, pertinent to which are histories in physical writers of this part, when wasted away or cut off being supply'd well enough by flannel continually worn upon the belly, as that particularly in the *gladiator* from whom *Galen* took away the *omentum*. This is a benefit which appears highly necessary in winter, as that before spoken of in facilitating by its slipperiness the motion of the guts, which seems peculiarly useful in summer, when excessive heat dries

dries up necessary fluidities. Beside, we may justly pronounce its fat a principal ingredient of the blood and nourishment of the solids. For as life consists in action and motion, a constant supply will be necessary for the abraded particles thereof: to supple the muscular fibres after long and painful contractions of labor, to moisten and lubricate the heads of the joints and tendons upon the same occasion, all which is best done by the smooth and oily balm from this reservoir. Likewise will it not be useful to envelop acrid juices and salts in the mass of the blood and prevent stimulations injurious to nature? will it not keep up the consistence of the vital fluid, in danger of dissolution in weather excessively hot? will it not guard the kidneys in their saline secretions? Another use of the fat is to render the skin soft and plump, and to anoint it as it were, in defence of the injuries of the air, which in some countreys they are forc'd to supply with vegetable oil. So nature has wisely contriv'd sweat of that unctuous quality, or otherwise our skin would have been perpetually defac'd and sore, with chops and chinks. Upon the same account it hinders the too great dissipation of the spirits, as we call them, or volatile parts of the blood, perpetually steeming from us by insensible perspiration. Has it not some share in the sublime composition of the animal spirits, the vestal *focus* or lamp of life, in many of which respects it may not improperly be call'd the *humidum radicale* of the ancients? Another great use of this adipose membrane we conceive to be the furnishing matter for the bile; for 'tis certain all the veins of the *omentum* enter the splenic and *porta* which lead directly into the liver, and the bile is a true saponaceous liquor, compos'd of oil divided and fix'd by salts, much after the same manner as our soap-makers practise in their art. Many more without question are the purposes assignable to this fluid by those who consider it *ex professo*. We shall only add that the grease of the *omentum* was well imitated by Dr. Grew in boiling spirit of nitre with oil of olives.

Next to this beautiful woof of the *omentum*, the prodigious view of the guts arrested our attention. The *colon* is thicker than a man's body, which as well as the rest, are full of large glands in the inward membrane like bottles, as big as the end of one's little finger. They appear, at least their secretory duct, like a bag with one small opening, so that upon any pressure either from the chyle or excrements passing thro' them, the liquor contain'd is squeez'd out, as when we squeeze a bladder or sponge. These bags therefore are reservoirs of that liquor to be us'd upon occasion, as the gall or urine-bladder: and hence appears the use of dissections of these large animals, for other creatures have the same glands, of the same artifice, but not easily observ'd because of their smallness. The mesentery too was very thick, spread over with large lumbar glands, the receptacles of the chyle and lymph. *Monsieur Suply* ty'd the two ends of a large peice of the intestines, after he had fill'd it with water. By pressure and an undulatory motion in imitation of the peristaltic, he endeavor'd to force the liquid into the chyloferous or lacteal vessels, but to no purpose: tho' he flatter'd himself these pipes would have been proportional in so large a creature. Great clusters of glands within the intestines of divers figures, the fabric and vastness of the connivent valves and the veins interspers'd thereon afforded the noblest spectacle imaginable, every thing appearing as thro' a microscope. The strength and thickness of the coats of the guts was remarkable, and the methods by which nature guarded it self against the inconveniences of so large a load of excrements.

The

The *plicæ*, *rugæ* and little openings of the excretory ducts of the glands in the *sphincter* of the *anus* are exceedingly curious. The bulk and ramifications of the mesenteric artery and mesariac veins upon the mesentery was very entertaining to behold.

It's observable this creature has no gall-bladder, even as horses and others; but the *porus biliaris* is manifold, several large pipes from the liver uniting into one cholidoc duct. This is of the thickness of a goose-quill, which passing about three or four inches, between the three tunics of the *duodenum*, like the *ureters* in those of the bladder, at last opens in its interior surface after a very curious manner. For there is a fleshy protuberance like the *anus* of a fowl, or the *os tinæ* and aperture of the *uterus* in the *vagina* of a woman, but much larger, and this serves admirably well the use of a valve. Beside the inside of this cholidoc pipe in its passage thro' the membranes aforesaid, has several carneous fibres or tendinous columns, like those of the auricles or ventricles of the heart; the reason of which extraordinary fabric is apparently to force the bile into the guts when there is need, and hinder its efflux at other times, (as we have lately asserted in the office of the spleen, whose texture it imitates.)

The inward substance of the liver in both our subjects was intirely putrid, resembling a flabby bag full of corrupt matter, which being thus wasted away, must needs bring on their death. Hence it is no wonder the creatures should be costive for want of the *stimulus* of the bile; and it seems this is the common disease of the inhabitants of those eastern countries about *Coromandel*, who so frequently dye of abscesses of the liver. The occasion of which may naturally be attributed to the heat of the climate, which exhaling the fluids too abundantly, leaves the active and corroding salts of the bile without sufficient diluents. To us it seems, that the common appearance of tanning in the sun-beams, and the gradation of complexions between the northern whiteness and the *æthiopic* dye, will easily account for the perplex'd question about the *indian* blacks upon the same principle. The liver was very small as to its proportion. The keepers of the elephants observe them naturally subject to costiveness, which is not to be wonder'd at, if we only consider the excessive bulk of the intestins; so that the immense quantity of excrements lodg'd therein must require extraordinary strength to expel them. These inconveniences must still in a larger degree affect such as are kept tame, and without sufficient action and exercise. Therefore are the masters of them frequently oblig'd to give them strong purges, as this following, *vizt.* *R aloes caballin. gambog. & colocynth. ana ℥vi. sem. palm. Christi, piperis longi Bengalens. zinzib. ana ℥iiij. sacch. seu Moloss. q. s. f. pilulæ n° xxiiij. per una vice.* Afterwards are administer'd the following corroborants of the stomach and expellers of wind.

R Calam. aromat. zinzib. galang. ana ℥iiij. piper. rotund. asæ fetid. curcum. ana ℥ij. sem. lactuc. & 4. calid. major. ana ℥iss. sacchar. commun. sive moloss. q. s. ad formand. pilul. mediocr. per una dosi.

Monsieur *Suply* speaks of the manner of treating the elephant in the strangury or retention of urine, 'tis this. If other things they administer fail of success: they tye him down very fast with great cords, so that he cannot possibly stir, and apply a broad fire-pan of iron, or such like thing heated red hot, to the region of the bladder, which presently produces the desired effect, as an extraordinary *stimulus*, from the prodigious contraction it causes in the muscles of the *abdomen* and circumjacent parts.

It

It is moreover customary in that country to apply a hot iron under the heel, in a *cholera morbus* with good success. Whoever is acquainted with the medicine of the east, will not wonder at these kind of practices which they use in almost every case. The reason and good effects whereof would doubtless bring them more in vogue among us, was it not for the terror which accompanies them. *Aristotle* says, the elephant is obnoxious to colical inflations of the bowels; which by dolorific contractions must needs hinder their natural evacuation by the *anus* and bladder.

The *pancreas* and stomach were smaller than one would imagine in so prodigious a creature; the spleen was four foot long, and near a foot in breadth about the middle, where the splenic veins and arteries enter. 'Tis of the same substance and contexture as the human, but of a darker red color and semicircular figure, broader and flatter towards the middle, as may be seen in Plate VII. Fig. II. *Galen* and *Aristotle* both take notice of the smallness of this *viscus*, as they think in proportion to the whole.

The kidneys were half a yard in length, of an ill shape, very flat, flabby, of a lurid complexion. The *pelvis* and its basins when open seem very small. The renal glands or *succenturiati* were as big as a child's head, of a very irregular figure, compos'd of a many other gland-like bodies, packt together into a strange form. When any of these were cut open, we found a cavity within, and they all seem'd to open into one cell, but yet no common or particular excretory duct discernable. One of their ends was lengthned out like the testicle of a cock, of a blackish color, which cut across had a cavity in it full of a brown and viscous humor. There are numerous arteries go to these glandules from the emulgent; one from the kidney it self, and as many veins from these mysterious bodies to the emulgent vein. So that their use seems to be only that they should serve as a bye path or communication between the emulgent vein and artery; that the circulation may not entirely be at a stand, whilst the kidneys are performing their office of secreting the urine. That lymph ducts arise from them, is only a part they bear in common with all the other *viscera*.

Pass we next to the cavity of the breast or *thorax*, which we observ'd very acute upwards toward the neck, contracting it self into a narrow space, and without clavicles as in horses, &c. The lungs of the elephant are not large, and adhere in both ours on all sides to the *pleura* and diaphragm as in fowls, which *monsieur Suply* thinks commodious enough in this *colossus* of a creature: the muscles of the *thorax* and pressure of the air being sufficient to expand them, and forward the circulation of the blood, perhaps better than if they had hung free in the cavity, where their bulk might possibly have been an impediment to their respiration: but in *Dr. Blair's* subject they did not adhere. The *trachea* had somewhat peculiar in its structure, the inward or posterior ends of the cartilaginous rings that compose it, lapping over one another. The bellowing of this creature is extraordinary great and terrible, partly owing to the length of his trunk, for which reason some of the ancients call'd it *tuba*, and now the *french trompe* upon account of its noise. The gland *thymus* was large and double. The heart is no less than two foot long from the tip to its base. 'Tis of a broad flat figure, and very flabby, wanting much of that firmness we might expect in this principal engine of so portentous an animal. The *septum* which parts its ventricles is very discernible externally, so that the whole *viscus* appears as it were double, and with two tips or points of the cavities;

which is the reason that *Ælian* and other authors thought it had a double heart. The whole view of this cavity is shown in Plate II. Fig. I. There were several lumps of hard fat upon the heart. The *pericardium* was very thin, and the water enclos'd in it of the usual dark bloody color. The auricles likewise and sides of the ventricles were very thin, but the coronary veins on the body thereof, interlacing one among another, form'd a curious appearance: the opening of the coronary artery at the *aorta* is big enough to admit ones thumb.

Opening the right ventricle, the tricuspid valves appear as drawn out Tab. III. Fig. IV. in their natural bigness, the tendinous fibres and fleshy columns of muscles mark'd AA and their use are well enough known. And Dr. *Blair* observes with us, each fleshy column is a true muscle with round bellies and tendons; nor is the number of the tendons in this valve so precise and invariable as to merit a denomination in the singular; for it's plain here are four tendons. There was likewise a transverse column or tendon which might with propriety be call'd *musculus cordis biceps*: as in Tab. III. Fig. III. attach'd by two muscular eminences to the *septum* and side of the ventricle, which no doubt very much assisted in the contraction thereof, and likewise hinder'd its too great dilatation upon the influx of the blood in the *diastole*. The same is observ'd in oxen. This may be look'd upon as a sort of gauge affixing the quantity of the transient fluid it ought to receive and throw out at one *impetus*. The auricles had nothing particular. Fig. I. in the same table shows one of the sigmoid valves of the pulmonary artery in its natural bulk.

The mitral valve of the left ventricle we have delineated in its just magnitude in Tab. IV. Fig. II. its prodigious bulk and strength is obvious, its numerous tendons and their various directions are remarkable. The two uppermost mark'd AA being long were inserted into the left auricle, the two inferior ones mark'd BB opposite to them were attach'd to the carnos columns within the ventricle, which were many and prodigiously strong. The two first antagonise the two second. Many other tendons there are, we see, of oblique directions to them, which all unite in one common office, both as valves and muscles, of hindring the reflux of the blood into the lungs, and of protruding it thro' the whole arterial system. So large is this body in this creature, that many blood-vessels are conspicuous upon it, especially in the lower part; and the whole confirms what we before intimated, that anatomists have not been sufficiently exact in the name given thereto, making the mitral valve but bipartite, and the tricuspid but threefold, seeing they are evidently but one valve, and the tendons which have occasion'd the denomination are of a much greater number in nature than in the name. In Tab. III. Fig. II. is seen one of the sigmoid or semilunar valves of the trunk of the great artery in its exit from the heart. What is chiefly notable in this and the former membrane, is the transparent tendinous expansion at each end mark'd C. C. C. C. which are the roots whence the fibres which compose them arise, and are seen to cross one another in the middle, as they pass from one side to the other. The superior ones at D. going to the inferior side of the opposite end at E. This is a beautiful contrivance of nature to answer her purpose in it, that their contraction may be uniform; doubtless the human is of the same make, tho' we do not know it has been taken notice of before, because not so conspicuous thro' their minuteness. In the whole, we cannot but

contemplate with the greatest pleasure this marvellous pump of so large a beast, the great spring of the whole machine. And monsieur *Suply* expatiates upon the difficulty even of cutting thro' the arteries and other parts, by reason of their strength and thickness, in order to take out the heart and lungs, and describes his *indian* assistants in number no less than a score, naked and arm'd with great crooked knives, going in and out from the *thorax* of this creature, like *Jonas* from the whale's belly, and compares them cover'd as they were all over with blood, to infernal furies.

Both ventricles and the beginnings of the great blood-vessels were well nigh fill'd with a *polypus* of a very tough consistence and color, between white and yellow; which certainly must very much retard the circulation, and by rendring it languid, prove one great occasion of the creature's death, which we may not improperly attribute to the jaundice. For if we conceive all the biliose particles of a fiery saline nature, resting and fermenting in the glandular substance of the liver, not able to expel them thro' a stagnation of the blood's motion; it's not difficult to suppose this must at length intirely destroy its fabric, and turn it into that purulent stuff we observ'd. It's not unreasonable to add, as another cause thereof, the tone of the spleen debilitated, which should have quicken'd the office of the liver, according to the theory we before advanc'd; and this we may infer from the apparent laxity of the fibres of the heart and all the other *viscera*. These *polypus's* well enough resemble calves-foot jelly, but of a more firm and fibrous contexture. Therefore the warm and quick purges before-mention'd are very judiciously administer'd by the *Indians*, to the creature lyable to these inconveniencies and coagulations, which probably are originally owing to the chyle being depriv'd of the volatilizing quality of the bile, in its passage thro' the intestines towards the heart. Dr. *Blair's* too had a very large *polypus*, which seem'd to be made of yellow fat. *Galen* says, he took a great bone from the heart of an elephant, which I suppose was at the origin of the *aorta*, as is frequently found in stags and other creatures, besides human. For which reason by the superstitious fancy of some, it has been introduc'd into the practice of physic, as a thing of great cordial vertue.

Come we next to that surprizing instrument its *proboscis*, which is compos'd entirely of a curious *compages* of various *strata* of muscles, laid upon and running across one another, their fibres being generally at oblique angles mutually intersecting, and inserted into cartilaginous bodies, spread several ways thro' its whole length, from which complicated mechanism it can perform all manner of motions like a serpent, as *Aretæus* well expresses it; giving the whole or any part, all together or successively, what degree of rigidity and tension, or lithness and mobility it pleases, from the influx of the spirits in muscular action. These muscles may in a general sense be said all to arise from a very broad and large insertion in the *os frontis*, depicted in Tab. V. Fig. 2. mark'd with the letters FFFF. whence the appearance of them in Tab. VII. Fig. I. is shown, as when separated therefrom. They may in the same general sense be suppos'd implanted into the great canal or cartilage, which runs in the center from one end to the other. These *fascia's* of muscles distinctly consider'd, consist of fibres, some of a longitudinal direction, some transverse or annular, some running obliquely to the right, some to the left. We discern the fore or upper part of the *proboscis* has only longitudinal muscles, whose bundles meet in the tendon on each side at one end, going the whole

whole length of the *proboscis* with the other extremity. The other *laminae* generally arise from the tendon or cartilage on one side, and are inserted into that on the middle or forepart, sometimes into one another; for these side cartilages reach not above a fifth part of the whole length from the head, in its thicker or upper part. On the outside of the upper muscle or longitudinal one, in its contracted state, we observe the fleshy bundles of fibres composing it, are of a wave-like posture, which upon lengthning or bending the part become strait, after the manner as is rudely imitated in Plate V. Fig. III. We must imagine the same of all the external muscles of the trunk, without which contrivance it could never bend or twist the member as it does at pleasure, and would have been in a great measure useless, or suffer'd much in its action, as the bark of a twig is crack'd and split upon the convex side in bending. How the minute *fasciculae* of these muscular fibrils are laid upon one another and implanted into the cartilages; how the vessels have free passage between them, their mutual *nexus's* and implications, and nature's inimitable workmanship thro'out the whole, where so many different intentions interfere not, is altogether astonishing. From a consideration of Figure I. in Plate V. and the counter-contractions of these muscles, we may easily get an *idea* of the manner of action in this wonderful part, whereby it can turn it every way, and becomes so very useful to the creature, and like an arm without bones. The cartilaginous body in the middle, which is the main strength and firm support of all the muscles, is divided into two pipes or nostrils, each bigger than ones thumb, of an oblong shape, pointed at one end, smooth and glib within. There is an intermediate *septum* all along it, from the head to the extremity, cartilaginous likewise. In its upper part only, next the head, and just by the *epiglottis*, are two valves which it closes at pleasure, whence are two passages into the mouth, and two into the spongy bones of the forehead: as is demonstrated in the afore-mention'd Plate V. Figure II. The muscles that serve these valves act, when by inspiration it draws up the water in this double canal for drink like as in a pump; when they are full by bending its trunk into a bow, it spouts it as a torrent into its mouth, or over its whole body, for coolness or cleanliness, and to drive off flies, by the force of expiration. The section of this trunk is shown in Plate I. Fig. II. Very large and numerous nerves go to the trunk, which are propagated all along by the sides of the arteries, as is usual thro' its whole length, all which are drawn in the before-mention'd Plate VII. Fig. I. They serve for the admirable motions of the part.

The view of the mouth is set forth in Plate VI. DD. The two great teeth whence our ivory, grow in the upper jaw: they have been found ten foot long. It's allow'd that the teeth of the males are longer than the females, but that the latter is of the finest grain, and the age of them is judg'd by the whiteness. Dr. *Strachan phil. transf.* n^o 277. says, some of them never have the long tusks. Authors are mightily divided, whether they should be reckon'd horns or teeth, as likewise about the casting them; some think it happens in about the space of ten years, not annually. They form themselves into a curve, the concave being forwards, quite contrary to the tusks of a boar, and which arise from the under jaw. Yet there seems no other difference between these two when compar'd together, than what arises from the beautiful contrast of nature observable in all her works. You may find the dispute whether they be horns or teeth manag'd

nag'd in *Pausanias, Heliacis*: in *Oppian de venat.* ii. The antediluvian elephants have been frequently found in the earth, even here in *England*, and impos'd upon the vulgar, who imagin'd 'em *exuviae* of giants. A tooth was brought to me this year, in possession of *George More, Esq;* of *Newark*, weighing between three and four lb. the whole *skeleton* was found in the cavity of lead-mines at *Wirksworth* in *Derbyshire*. Sir *Hans Sloan* has some bigger than this. In the continuation of the abbots of *Peterburgh's* chronicle by *John de Boston*, lately publish'd by Mr. *Sparkes*, there's an account *anno MCCC XLIII* that such another was found at *Bardney, Lincolnshire*, and thought a giant, but the description sufficiently clears the matter. So Mr. *Aubury* in his *ms.* collections of antiquities in *Britain* and *Ireland* tells us, elephants bones have been dug up out of a spring at a camp on *Mamtor-hill*, near *Castleton* in the high-peak of *Derbyshire*. Mr. *Cambden* in *Essex* p. 351. speaks of the like from *Ralf de Coggishal* found near the *Nefs* point: and many instances there are in foreign authors.

The skull of the elephant is not very large, especially its cavity that contains the brain. But 'tis remarkably thick; for its inward and outward walls are separated to a considerable distance, by a vast number of bony cells, especially in its fore part and sides. These *sinus's* of irregular figures and magnitudes generally communicate one with another, and end in the common duct of the nose. Hence it is that when darts or arrows are struck into its head, and the hunter imagines the creature kill'd: he pulls them out with his trunk without harm, for they cannot penetrate into the recess of the brain. The reason of this seems only to swell out the external bulk of the head, and make it a little more shapely and proportionate to the bulk of the animal, without enlarging the brain more than necessary: therefore may be look'd upon as a fine stroke in drawing, to give a greater grace to the *contour* of her figure, introduc'd by nature, studious of beauty and symmetry as well as convenience. We saw'd off the upper part of the *cranium*, which exhibited a most noble and delightful view of an horizontal section of the brain and cerebel with its branching texture, quite thro' the *septum lucidum*, whereby the *corpus callosum*, ventricles and *corpora striata* were visible; as represented Tab. I. Fig. I. The whole compofure of the brain was not inferior to that of the human, and discover'd its beauties proportionable to its bulk, especially in all the pairs of nerves, which were large and very discernible, particularly the recurrent upon the body of the *medulla spinalis*, in the cavity of the *vertebræ colli*, together with its blood-vessels. The olfactory nerves were very broad, as being the origin of those numerous *propagines* disseminated thro' the trunk. We took off a most delicate *plexus* of the arteries that ran upon the outward surface of the brain under the *dura mater*, and extended it upon fair paper, which was left in the custody of Sir *Hans Sloan*. The whole structure of the contents of the head was so fine and perfect, that we need not wonder this creature, according to history, should be the wisest of all brutes, and even endu'd with human passions. *Elephanto belluarum nulla prudentior*, says *Cicero* i. *de natur.* *Omnium quadrupedum subtilitas animi præcipua illis perhibetur*, *Plin.* 'Tis allow'd on all hands, that they are of an incredible docility and sense of things, mansuete and a lover of company. It's needless to repeat the many stories of its understanding music, language, gratitude, memory, revenge and the like, which will not come under the denomination of instinct as we term it in other animals, and are largely noted in writers of history and tra-

vels in the eastern parts of the world, where they are chiefly bred, and esteem'd by the emperors of those countries as a kind of deities, on whose fate depends that of their kingdoms: on whose account sometimes they have made great and terrible wars upon one another. Much of this nature in *Pliny's* eighth book and others. Their sense of smelling is said to be very acute, and they are exceedingly pleas'd with odoriferous herbs and flowers. They delight much in finery, and to be adorn'd with gawdy trappings. They tell us, they are sensible of the beauty of a woman, and upon sight thereof will remit of their fierceness and anger, when provok'd to a passion. It's affirm'd they love to be prais'd, caress'd, and flatter'd with magnificent and pompous titles, such as they bestow on their emperors; that they are sensible of kind promises of good pasturages and such fruits as they admire, which they will resent very much, if not punctually perform'd. *Pliny* and *Ælian* say they have been taught to write. Who will be incredulous, when we are assur'd so bulky a creature has been instructed to dance on ropes, for the entertainment of the *Roman* people, in their amphitheatres? *Arrian* and *Martial* say, they learnt them to dance to musick in time and measure. Whoever have a mind to divert themselves with the whole history of the elephant, may find it in *Aldrovand* and *Gesner*, where every thing is collected together that has been written in any author concerning it.

They are said to be a very chaste creature, and never accompany with more than one female, and in such obscurity that no one has ever been able to detect them. *Ælian* affirms too that it is but once in their lives, purely for continuance of their *species*. *Aristotle* adds, not till they are 20 years old. Some authors affirm, the time of their gestation is about a year and half, others two years, and bring forth single births. *Ælian* says, the young elephant is about the bulk of a calf of a year's age, and that it sucks with its mouth, not its trunk. We know not whether credit ought to be given to him, affirming, that they are not unwilling to have their young ones taken away, as judging the noble and generous nature of mankind will not injure their offspring, but rather cherish it. We are next brought to consider the parts of generation, whose strangeness has puzzl'd all anatomic enquiries, even so far that they have not been able generally to determine the very difference of the sex. Monsieur *Suply* says, in the *abdomen* of that he dissected, was found under one of the kidneys, a round body bigger than a man's head, cover'd with a strong and thick membrane of a like contexture and substance with that of the renal glands, but without any apparent cavity or excretory vessel: he immediately imagin'd it to be one of the testicles, but finding none on the other side correspondent thereto, he chang'd his sentiment, and owns his ignorance of what it should be, or where they are situate in this creature, seeing nothing appears outwardly either in the male or female as in other quadrupeds, but a kind of little pouch hanging under the belly. He says the *penis* measur'd in its contracted state 4 foot in length, cut off as close as possible from the *corpus nervosum* and *os pubis*. That the conduit of the *urethra* was very smooth and shining within, and would admit the introduction of a finger, that it was in the main like the *priapus* of an horse. The great naturalist of *Stagyra* says the *penis* is like a horse's, but small, and that its testicles are not visible outwards but plac'd near the kidneys. Upon view of the external *pudendum* which is not large, we pronounc'd ours a male from the resemblance of

the *clitoris* to a *penis*. It had all the nerves, muscles, arteries and veins thereof, but was no more than two hands breadth long, and thick proportionably. Upon further *examen* we discover'd the *vagina*, which corrected our mistake; this was wide enough to admit a hand, and extended itself backwards from its orifice upon the belly, till it came to the *os pubis*, then reflecting forwards ended in the opening of the bladder and womb, not far distant from each other, under and beyond the *os pubis*, the *clitoris* accompanying it all the way. This conformation could not but surprize us, and put us upon reasoning, what should be the intent of nature, in so strange a procedure. The opening into the *uterus* was by two *foramina*, just like two nostrils; after it has gone some length distinguish'd by a *septum* all the way, it becomes one cavity, and at the same time divaricates into the two *cornua* as is usual in other beasts. A great body of fat on each side stretched themselves from the *vagina* round the bladder, all the length of the *cornua*. We observ'd these collections of hard fat in this creature, to abound in all the cavities, perhaps on account of some reasons we have offer'd above, when mention was made of the *omentum*. The *capsula's* of the ovaries had fibrous columns reaching from one side of its inward membrane to another, like the auricles of the heart. There were large *lacunæ* in the coat of the *vagina*. The bladder would contain about five gallons. It seems as if this creature voids its urine all at once, like the throwing of water suddenly out of a vessel, which is probably perform'd by the *vagina* receiving it from the bladder into its whole capacity, and then spouting it out.

This is what appear'd upon first view as to the parts subservient to generation in a female as our creature; but Dr. *Douglas* took them home with him to examin more nicely, and thereupon gives his sentiments in the subsequent account.

AT the opening of the young elephant in Sir *Hans Sloan's* garden, I chiefly applied my self to the dissection of the *proboscis* and uterine parts, having with all the care, the inconveniencies of the place and badness of the weather would admit of, separated the first from the head, and taken the latter out of the cavity of the *pelvis*, and then had them both carried home to my own house: where the remarks I made on the *uterus*, I have drawn up in the following manner.

The parts then to be examined are; 1. the *clitoris*. 2. the *vagina*. 3. the *uterus*. 4. the *cornua*. 5. the *ovaria*. and in the last place to consider the posture for copulation, which the uncommon situation of some of these parts does occasion.

1. The *clitoris*, which in all respects does very much resemble the human *penis*, arises by two *crura* from the lower part of the *os pubis*, which soon uniting make up one body thirteen inches long, and ascending towards the navel upon the muscles of the belly behind the *vagina* which firmly adheres to it, terminates (leaving the wider integuments) into a longish round part cover'd with a fine skin, which appears very like the *glans* of a negroe's *penis* in color as well as in shape, but has not the least appearance of any perforation or hole in it. This *glans* or *balanus* is one inch and an half in length, and about three inches round. The substance of the *clitoris* is spongy and reticular, cover'd with a thick and white nervous case or *involucrum*, as the *penis* is in men. The blood-vessels and
nerves

nerves are ramified on its *dorsum* or back, after the same manner they run on the *penis*. It has also two muscles, that in their beginning, progress and insertion do resemble the *erectores penis* in men. Along the back of this part there runs a large round tendon between the two nerves, under a particular membranous covering as in a case, and prevents its starting in time of action, which is made up by the union of the short tendons of two muscles which arise from the *pubis* near the beginning of the *crura clitoridis*, and terminates by a thin expansion at the lower end of the *clitoris*, and also into the skin of the belly that comes round the *glans* as a *præputium*. The use of this pair of muscles seems to be to unsheath the *glans* by drawing the skin downwards nearer the *pubis*.

2. We come next to examine the *vagina penis*, which for its length and situation is particularly remarkable, and very different from any thing I ever met with in any other animal as far as I remember. Its external opening, which is the *orificium pudendi*, is not near the *anus* as in other females, but upon the belly, midway between the *pubis* and navel just under the *glans clitoridis*; which was the reason why I mistook the sex upon a slight examination of the external parts; for observing no orifice nor opening near the *anus*, and seeing a large and well formed *glans* near the navel, I took it for a male, and was not undeceived till I parted the *ossa pubis* and came into the cavity of the belly: from thence it went down to the bottom of the belly, passed over the broad fore part of the united *ossa pubis*, and where they parted entered between and penetrated further into the cavity of the *pelvis*, between the *rectum* and *vesica*, and ended at the *osculum uteri inferius*. On the outside of the belly its connexion is to the body of the *clitoris*, and within to the *rectum intestinum* and *vesica urinaria* as in other subjects, being in length about twenty inches. As to its capacity, it is narrowest where it is lost in the skin of the belly, which here forms a kind of *labia*, the outer skin being thin and of a whitish color. It becomes a little wider near the union of the *crura clitoridis*, and from thence it grows still wider till it receives the *meatus urinarius*, and then above that opening it contracts a little just before it ends: the widest part being seven inches round the sides of the *vagina*, being laid flat upon one another, but when blown up it appears so large as to receive one's fist; where it adheres to the *clitoris* it's not much above five inches. On the inside of this passage, we observe the large orifices of several glands. Its substance is half an inch thick, between the place where the *vesica* opens and a little below the union of the *crura* of the *clitoris*, and looks of a reddish color when opened: where it adheres to the *clitoris* it's not much thicker than ordinary, excepting its muscular coat. This *vagina* is provided with one pair of muscles and one *sphincter*. The first arises from the *ischion*, fleshy and narrow, and passing near the *sphincter ani*, from which it seems to receive some part of its origination, it is spread over one side of the *vagina*, and then is inserted into the *clitoris* a little below the union of its *crura*. As it passes from the *sphincter* of the *anus* to the *vagina*, it forms a thick bundle or *manipulus* of fleshy fibres, and there it spreads it self on the back of the *vagina*. The second muscle lies under the inside of the *ossa pubis*, arising also from the *ischion*, from whence passing over a kind of tendinous pulley it covers one side of the *vagina*, and then in the middle joins its fellow of the other side; and when these act the passage of the *vagina* must be straitned. The *sphincter* muscle covers the neck of the bladder

bladder as well as the upper part of the *vagina*, and so serves chiefly to hinder the involuntary excretion of urine.

3. *Uterus*. The part that lies between the ending of the *vagina* and the opening of the two *cornua*, may well be esteemed to be the *uterus* or *uteri fundus*, being in length nine inches, and laid open upon an easie stretch it measures about eight inches. Its inside is of a whitish color, and pretty full of wrinkles. The lower part is contracted, and opens into the *vagina* by two orifices with an intervening thin *septum* about the breadth of an inch: this part being viewed from the opened *vagina* exactly resembles the nostrils. At its upper part, where the *cornua* open, we observe two *labia* or lips with a large opening between; one of them is broad and large, but the other is much narrower, and contracted. These *labia* are nothing but a reduplication of the inner coat, which is wrinkly and rugous in several places and of a white color, but has no muscular coat on the outside.

4. *Cornua*. We must divide each *cornu* into two parts, to have a distinct notion of the whole. The first I call the united part, because it appears to be so, being both cover'd by the *peritonæum* and entirely freed from any adhesion to the *rectum* or *vesica*: yet they are distinguish'd in their whole length by a longitudinal *septum*, as you may observe in this one that is laid open. The other is entire; yet there's not any appearance of a *fulcus* or depression in the middle as a note of distinction. Each of these *cornua* is about nine inches in length. The separated or distinct part of the *cornu* is ten inches in length, *i. e.* between the place where it parts from its fellow to its termination in the *ovarium*. Its widest part when flatted out is something above two inches, but when blown up by inflation its near seven inches round; they both run streight laterally, and not in an undulating manner as they do in most quadrupeds. There are no wrinkles, much less any cells, in this part of the *cornu*, its inside being very smooth and even, and nothing like any protuberances when blown up. It grows very narrow just as it ends at the *ovarium*. Tho' no wind passes out at this end, yet there must be a communication between it and the ovary. They are made up of two distinct membranes, the innermost of which is full of glands. One side of the *cornua* is fix'd to the *peritonæum*, which is commonly call'd the *ligamenta lata*, and is here loose and floating, and cover'd with a great deal of fat; but all the rest is free from any adhesion.

5. *Ovarium*. From the place where the *cornua* terminate in the *peritonæum*, there seems to be continued from them a large membranous *capsula* or bag, and probably has the same use with the *fimbriæ vel ornamentum foliaceum* in the *tuba falloppiana*, which is to clasp about and embrace the ovary in time of impregnation; and as that in women is a continuation of the substance of the tube it self, so this bag is nothing else but a production and dilatation of the *cornu*. In figure and shape it very much resembles the right auricle in the human heart; it is made up of two membranes, the innermost of which is divided in the middle, and between the duplicature in the lowermost half there's a plain canal that leads towards the *cornu*, made, I suppose, for conveying the foecundated *ovulum* into that part. The ovary or egg cluster is connected to the *peritonæum* which is fixed to the *ilia*, having all round the

same a great deal of fat inclos'd between two membranes. It is flat and thin in this young animal, and thro' the wrinkled skin there may be seen several white specks which are the *rudimenta ovulorum*. The distance between the two ovaries is twenty five inches.

6. The manner and posture of their copulation comes next to be consider'd, which is something difficult to determin without some notion of the structure and situation of the *penis* in the male; but supposing that his genital parts are like those in a horse, which was advanced many hundred years ago by *Aristotle* himself, *genitale equo simile habet sed parvum*, and confirm'd lately by Dr. *Moulins*, in the anatomy of the elephant he dissected at *Dublin*, where he says the *penis* was larger than that of a stone-horse, but hardly so long. Now I say, supposing this, the posture must be as follows, and almost in the same manner as *Aristotle* has express'd in *Theodore Gaza's* translation, *subsedit fœmina, clunibusque submissis insistit pedibus ac innititur: mas superveniens, comprimit atque ita munere venero fungitur*. That is in short, the female must be in a supine posture or lying on her back, and that either in a ditch, or as *Tavernier* will have it in a bed of herbs or weeds four or five foot high from the ground, and the male in a prone posture, and so must enter *more humano*; and in order to bring the *orificium vaginae*, which is at a great distance from the *anus*, the first pair of muscles we have described as belonging to that part, together with the influence of the *retractores præputii*, which we have likewise seen, are provided and contrived by the wise architect of all things, to draw down and approximate that part to the *pubis*, being much assisted by the efforts of the *penis* and general contraction of all the parts *vigente vere*. There seems to be still another way, could the big unwieldy animal perform it; and that is for the male to get upon the female lying on her back with his head towards her hind legs. If neither of these will do, it is certain and demonstrable from the known situation of the female parts, that the *coitus* can never be performed *more brutorum*, i. e. neither [by getting up behind as horses, &c. neither breech to breech, as the animals called retrocoient, such as hares, &c.



E X P L I

EXPLICATION of the PLATES of the ELEPHANT.

Tab. I. Fig. I. A section of the upper part of the scull of the elephant sawed quite across. A. denotes the forepart or *os frontis*, where its cellular caverns are remarkable before and on the sides. B. the medullar. C. the cortical part of the *cerebrum*. D. the *corpus striatum* making the right and left ventricle. E. the *septum lucidum*. F. the *cerebellum* with its foliage-work. G. the back part of the scull without caverns. H. the passage of two blood-vessels between the *cranium* and *dura mater*.

Fig. II. a cross section of the trunk of the elephant. A. its fore or upper part. BB. the double cartilaginous pipe or nostrils. CC. the blood-vessels and nerves. DD. its muscular *laminae*.

Tab. II. Fig. I. shows the *thorax* open'd. A. the *oesophagus*. B. the windpipe. CC. the lungs. DD. the cartilaginous ends of the ribs whence the *sternum* is separated. E. the heart with its coronary vessels. F. fat lying thereon. G. the right auricle. HH. the carotids from the head. II. the axillaries from the arms. K. the diaphragm. L. the liver. M. *ligamentum umbilicale*. N. the stomach. O. the *pylorus*. P. the margin of the *omentum*.

Fig. II. the *abdomen* open'd. A. a piece of the upper limb of the *omentum*. B. the *ligamentum umbilicale*. C. part of the stomach. D. part of the spleen. E. part of the *duodenum*. F. the *colon*. GG. the *peritonæum*. H. the *omentum*.

Tab. III. Fig. I. one of the figmoid valves of the pulmonary artery as big as the life. CC. the tendinous expansions. D. E. show the decussation of its component fibrils.

Fig. II. one of the figmoid valves of the great artery equal to nature. CC. the tendinous expansions. D. E. the decussation of the fibrils.

Fig. III. is a fleshy column going from the *septum* to the side of the right ventricle of the heart.

Fig. IV. the tricuspid valves of the right ventricle of the heart in their natural bulk. A A A A. the roots or tendons thereof, cut off from the sides of the ventricle. B. the membranous part.

Tab. IV. Fig. I. a piece of the *omentum*, with the veins, arteries, and adipose vessels.

Fig. II. shows the mitral valves of the left ventricle of the heart, according to their real magnitude. A A. denote the two tendons implanted in the left auricle. B B. two tendons their antagonists, inserted in the sides of the left ventricle. C C. are blood-vessels dispersed over this part of the valve.

Tab. V. Fig. I. a piece of the *proboscis* where the several muscular *laminae* of different directions are visible, and how they are implanted into the cartilaginous lines that run thro' its whole length. A. is a muscular *stratum* separated on one side. B. a cartilage running the length of its upper or fore part. C. one of the side cartilages running a fifth part of its length.

Fig.

Fig. II. shows the fore part of the scull or forehead, where is the origin or implantation of all the muscles and cartilages of the *proboscis*. A. the *os frontis*. BB. the *sinus's* of the nose. C. the *septum nasi* continu'd thro' the whole trunk. DD. the bases of the valves near the *epiglottis*. EE. passages into the mouth. FFFF. the origin of the muscles of the *proboscis*. GG. passages from the spongy cells of the head.

Fig. III. the manner of the appearance of the upper or external muscle of the *proboscis*, the fibrils whereof by lengthing become strait, or reduce themselves into a wave-like figure according to the variety of their action.

Tab. VI. shews the mouth of the elephant. A. the trunk. B. the palate or roof of the mouth. CC. the lower jaw divided in the middle. DD. the tusks breaking out. EE. the lips. FF. the four grinders in the upper jaw. G. the glands in the roof of the mouth. H. the tongue thrown back. I. the muscles of the cheeks. K. the *uvula* and throat. L. the *os hyoides*.

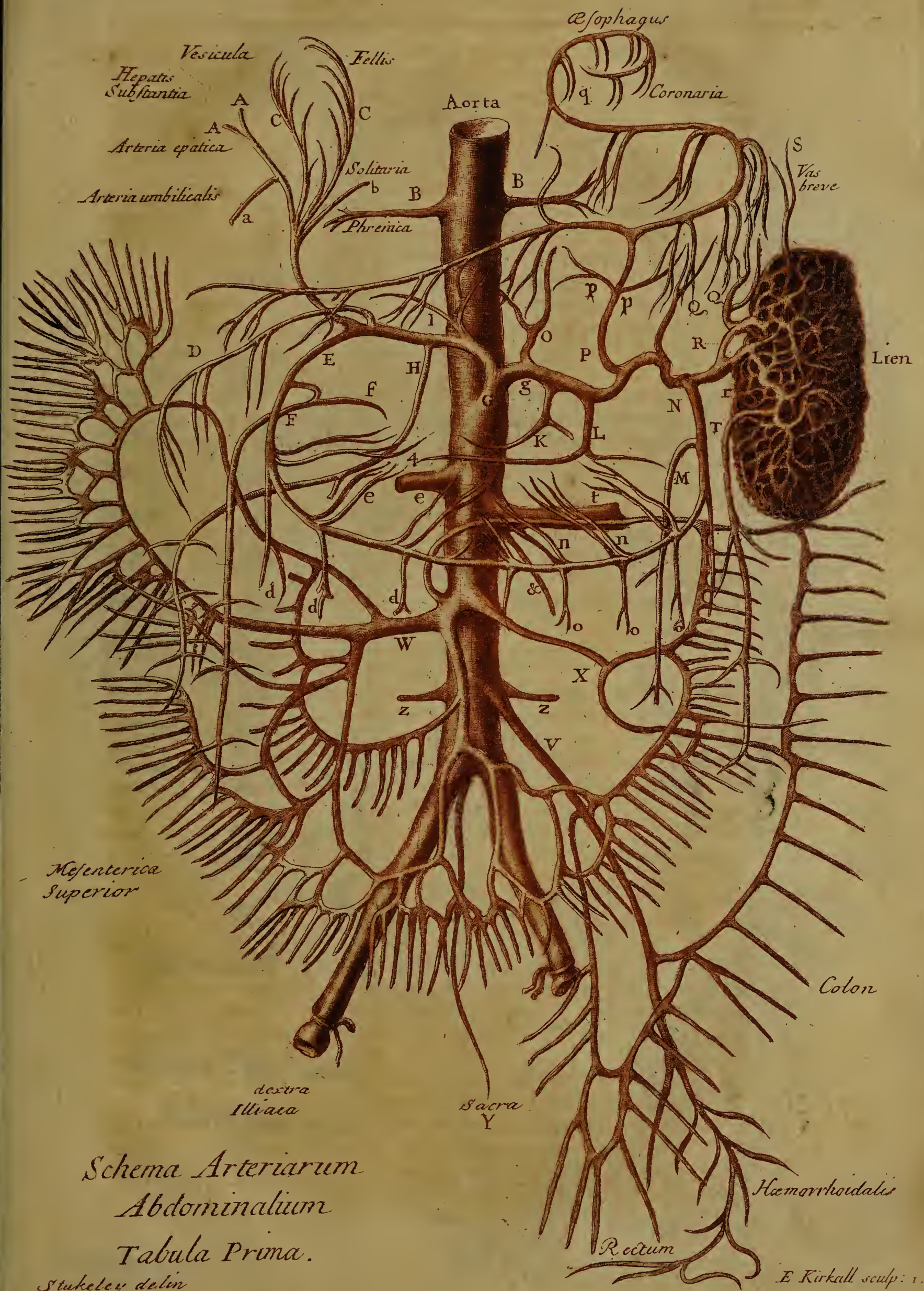
Tab. VII. Fig. I. demonstrates the root of the *proboscis* separated from the *cranium*. A. the under side of the *proboscis*. B. *os nasi spongiosum*. CC. two valve-like bodies at the opening of the two pipes of the trunk, upon the spongy bones of the nose. D. the cartilaginous *septum* between the two pipes or nostrils. EE. the origin of all the muscles of the *proboscis* cut from the scull. FF. nerves going to the body of the *proboscis*. GH. veins and arteries accompanying them. I. the fore part of its insertion upon the *os frontis*.

Fig. II. the concave side of the spleen, where the veins, arteries and nerves enter in a line passing thro' its middle.

Fig. III. a section of the *medulla spinalis* in its natural bulk, of a young elephant.

Tab. VIII. the parts of generation in a female elephant seen from the back part. A. *glans clitoridis*. a. *orificium vaginae*. B. *vaginae dorsum*. CC. *musculi retractores præputii*. DD. *crura clitoridis*. dd. *musculi ejusdem*. EE. *constrictores vaginae*. F. *sphincter ani cum glandulis suis inter plicas latentibus*. G. *Musculus elevator ani*. H. *intestinum rectum*. I. *vagina aperta* & *orificium vesicae*. K. *duplex uteri orificium*. LL. *ligamenta vesicae suspensoria*. M. *vaginae pars superior aperta, ubi orificium uteri & labium ejus*. mm. *ureteres*. N. *cornua ad invicem juncta, alterum clausum, alterum apertum per longitudinem*. OO. *ovaria, alterum capsula exutum*. P. *vesica*. QQ. *fimbriae*. RR. *rami venae hypogastricae*. SS. *ligamenta lata vasculis interspersa*.

F I N I S.

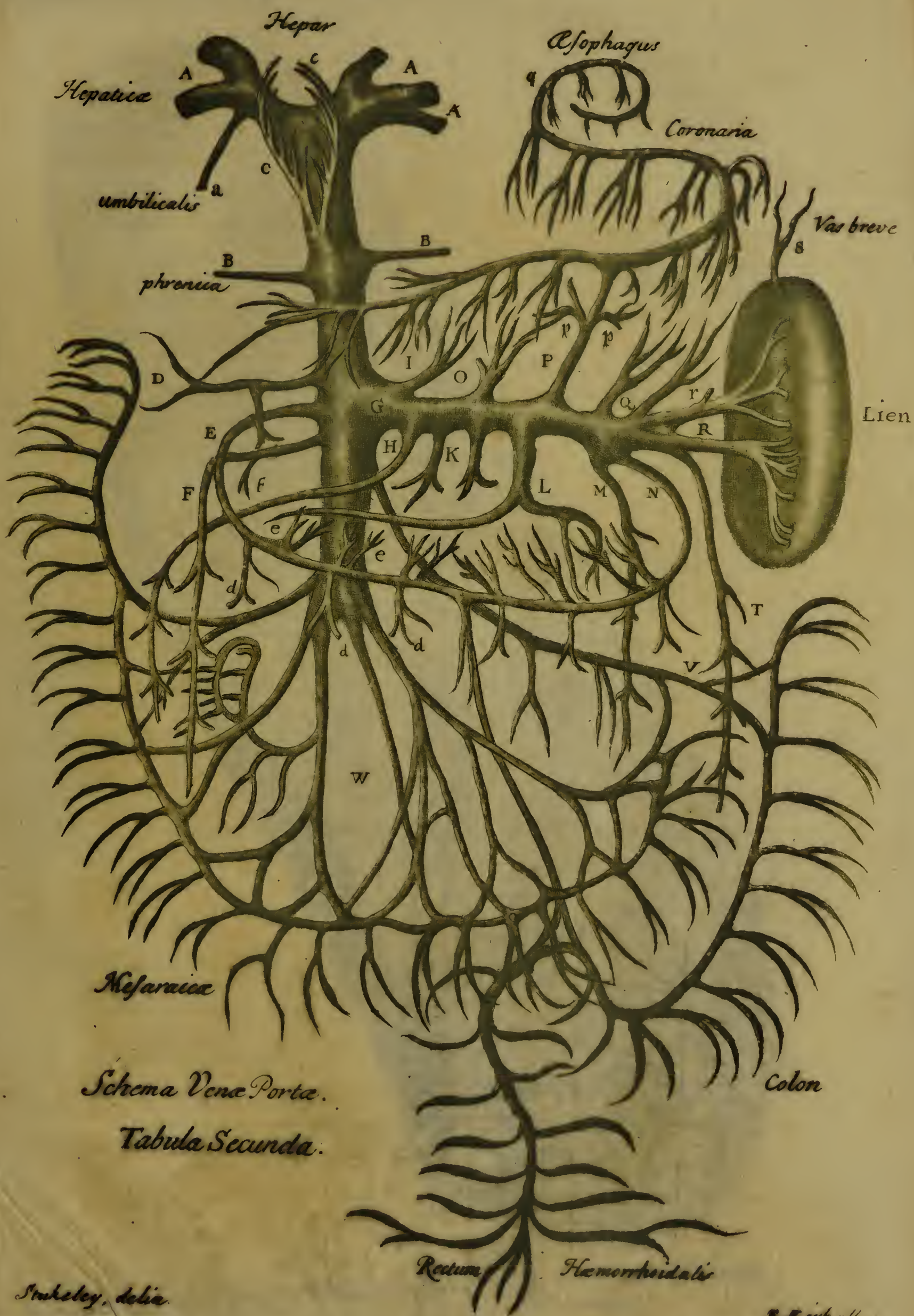


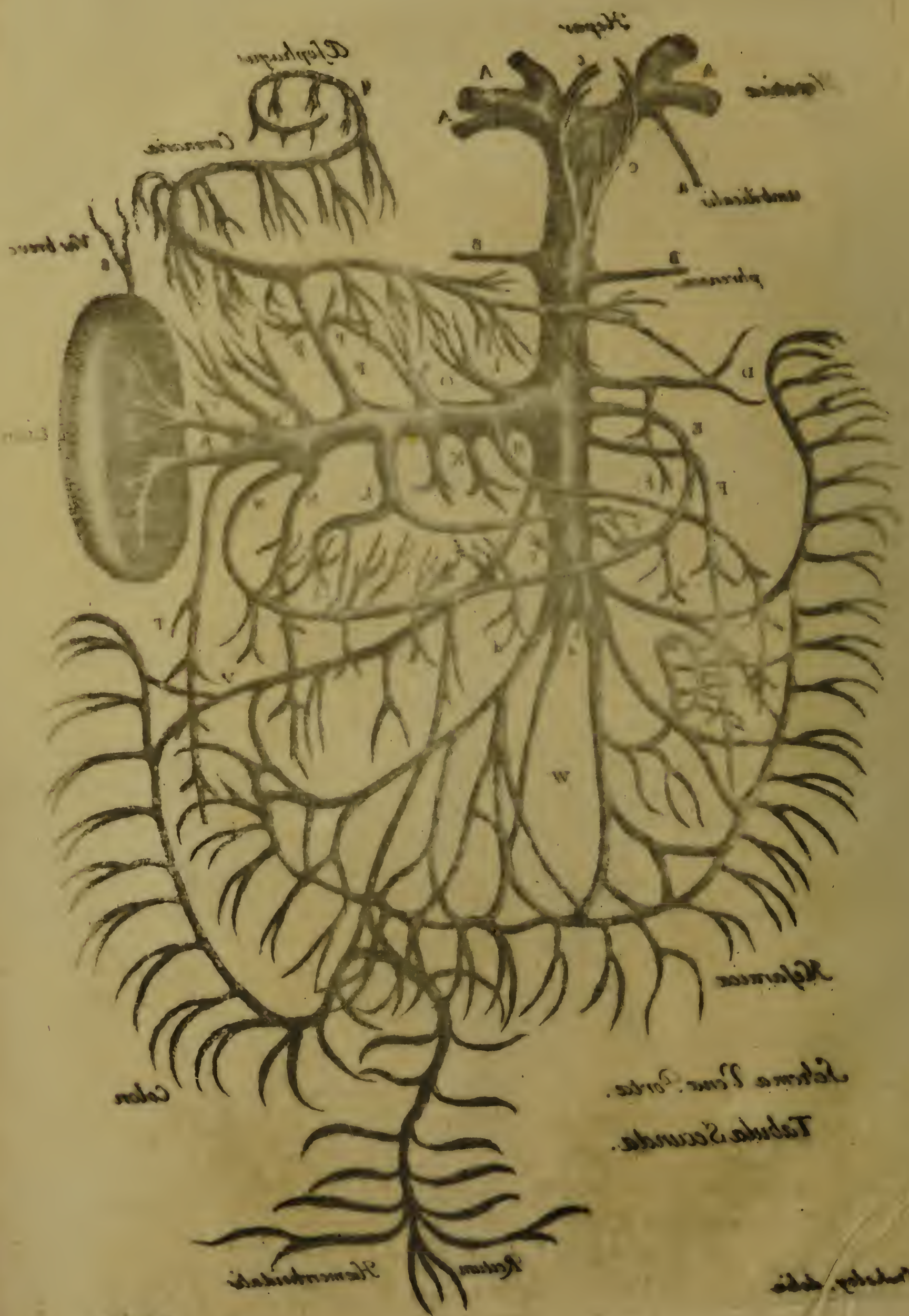
Schema Arteriarum
Abdominalium
Tabula Prima.

Stukeley delin

E Kirkall sculp: 1.







Longitudinalis Sectio Splenis bovini, arteriis cera impletis.



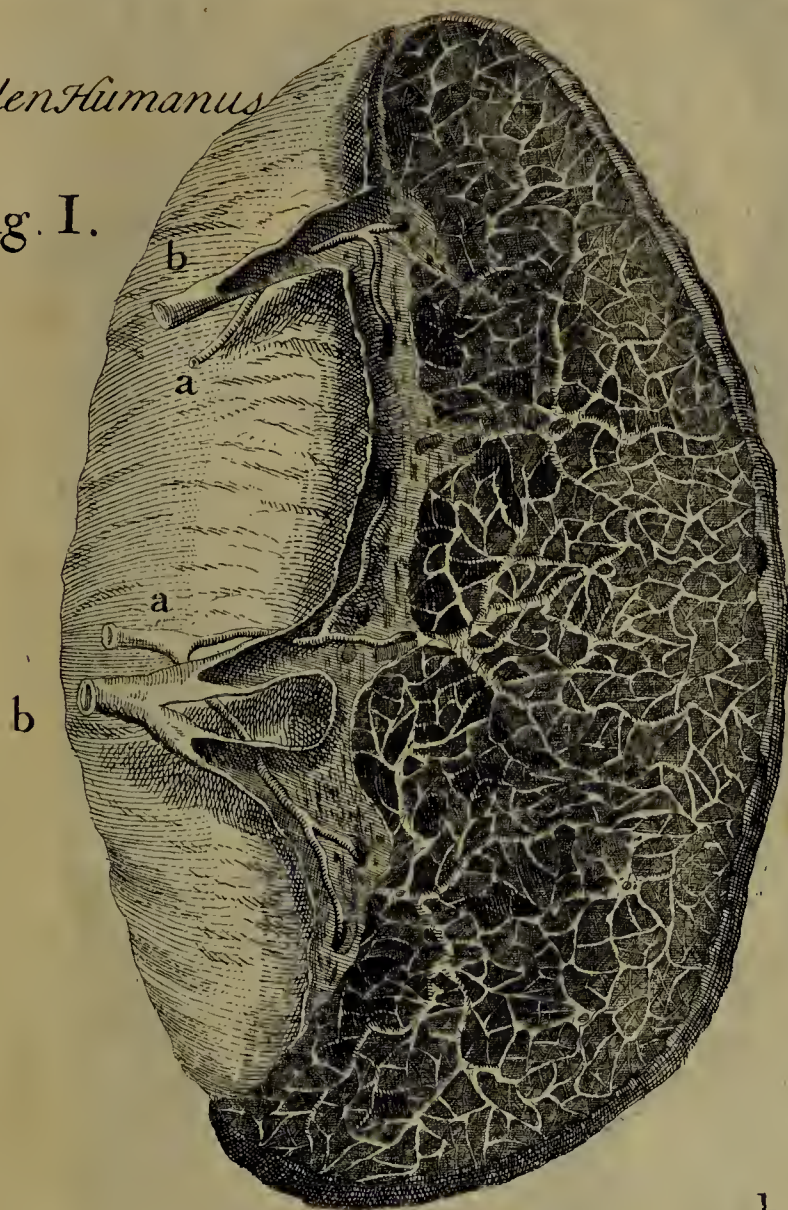
Tabula Tertia

*Doctissimo Viro Henrico Plumptre MD. Præceptori olim, nunc Collegæ,
Elegantissimi Visceris Iconem Dicat W.^m Stukeley.*

G. V. Gucht Sculp.

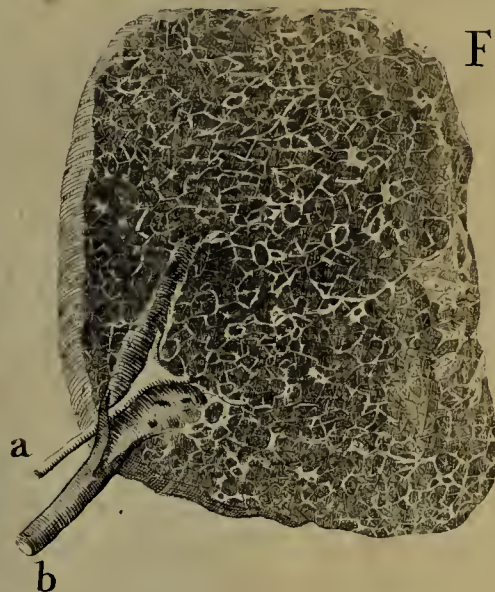
Splen Humanus

Fig. I.



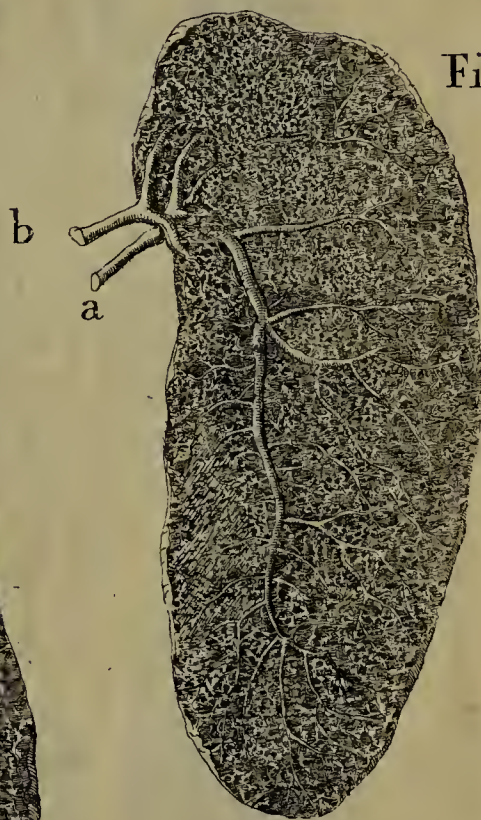
Splen rupicaprae Alpinae

Fig. II.



Splen Ovinus

Fig. III



Splen Pueri Fig. III.

B

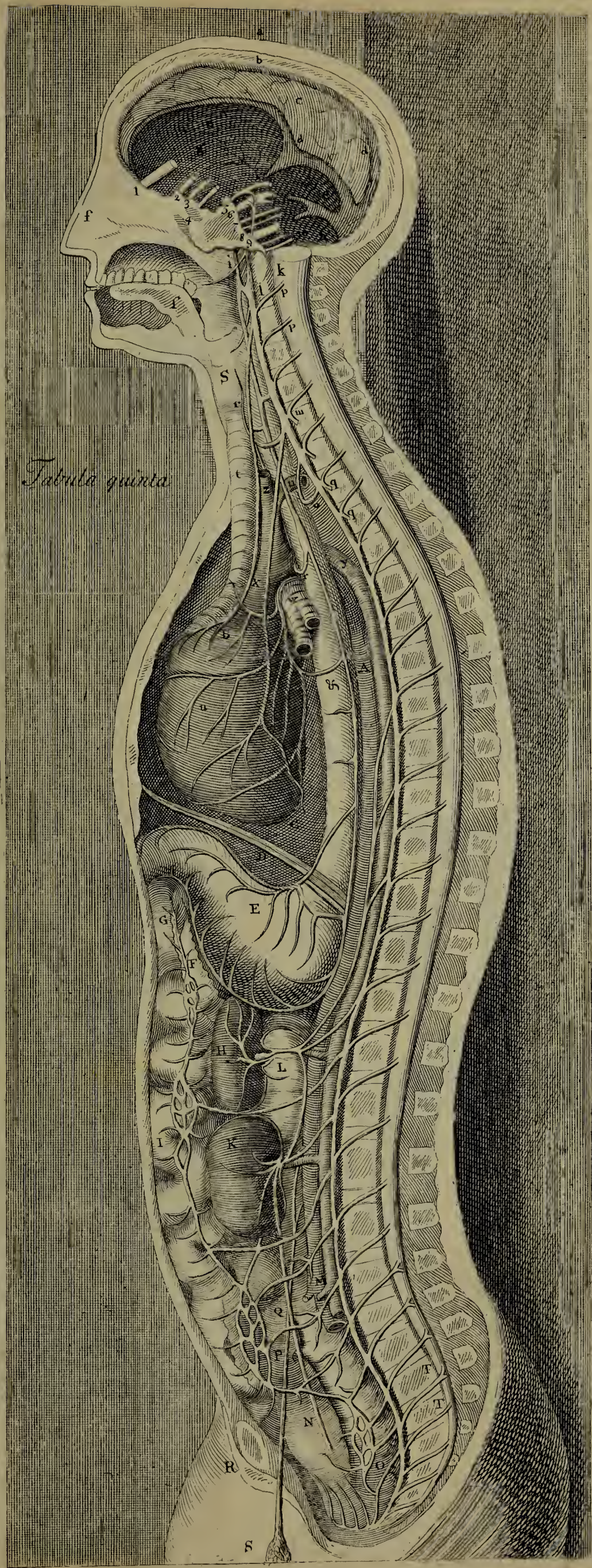
C

Tabula quarta

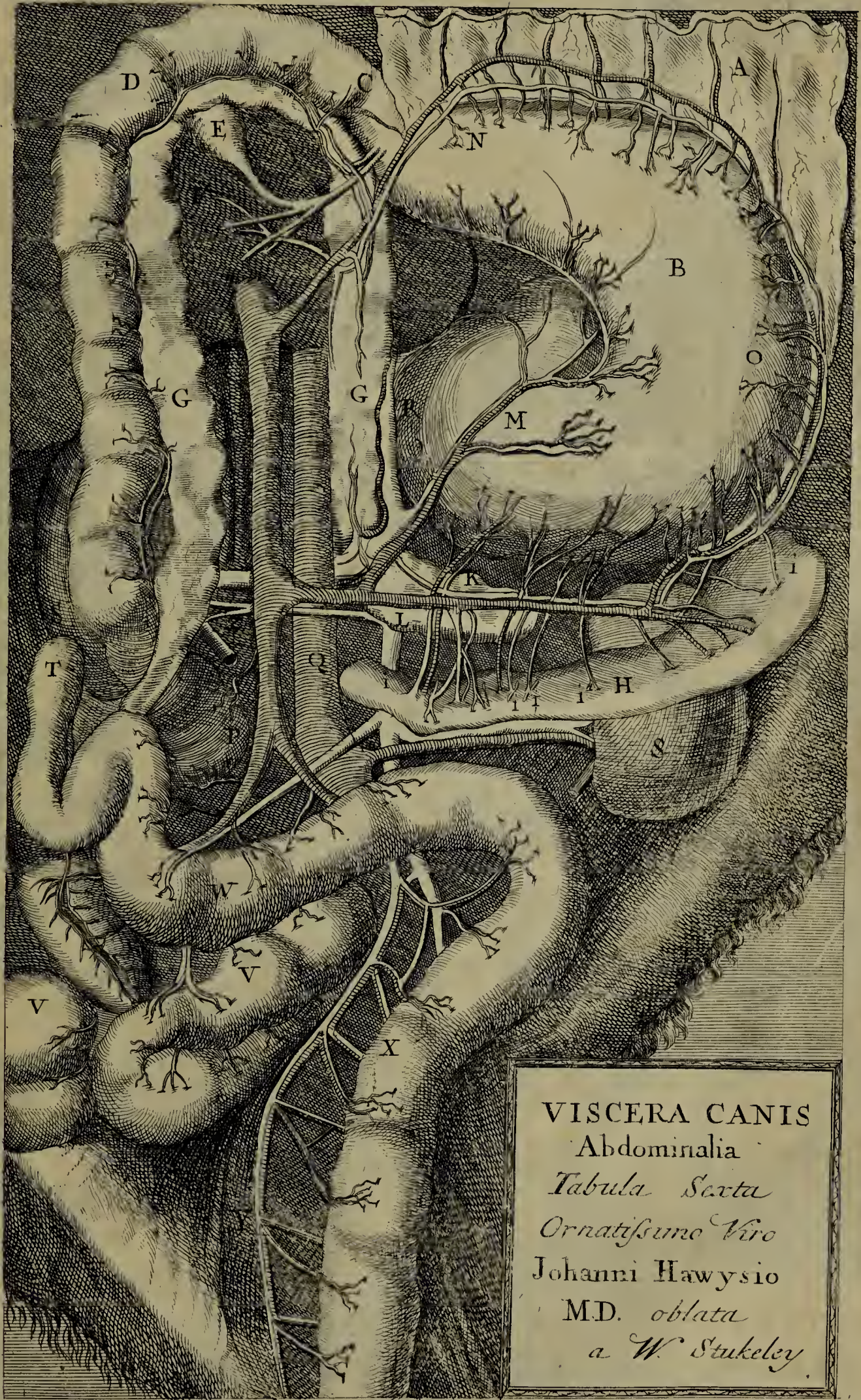
Fig. V.

A

Cl. Richardo Mead M.D. Naturæ opus elaboratum D.L.M.

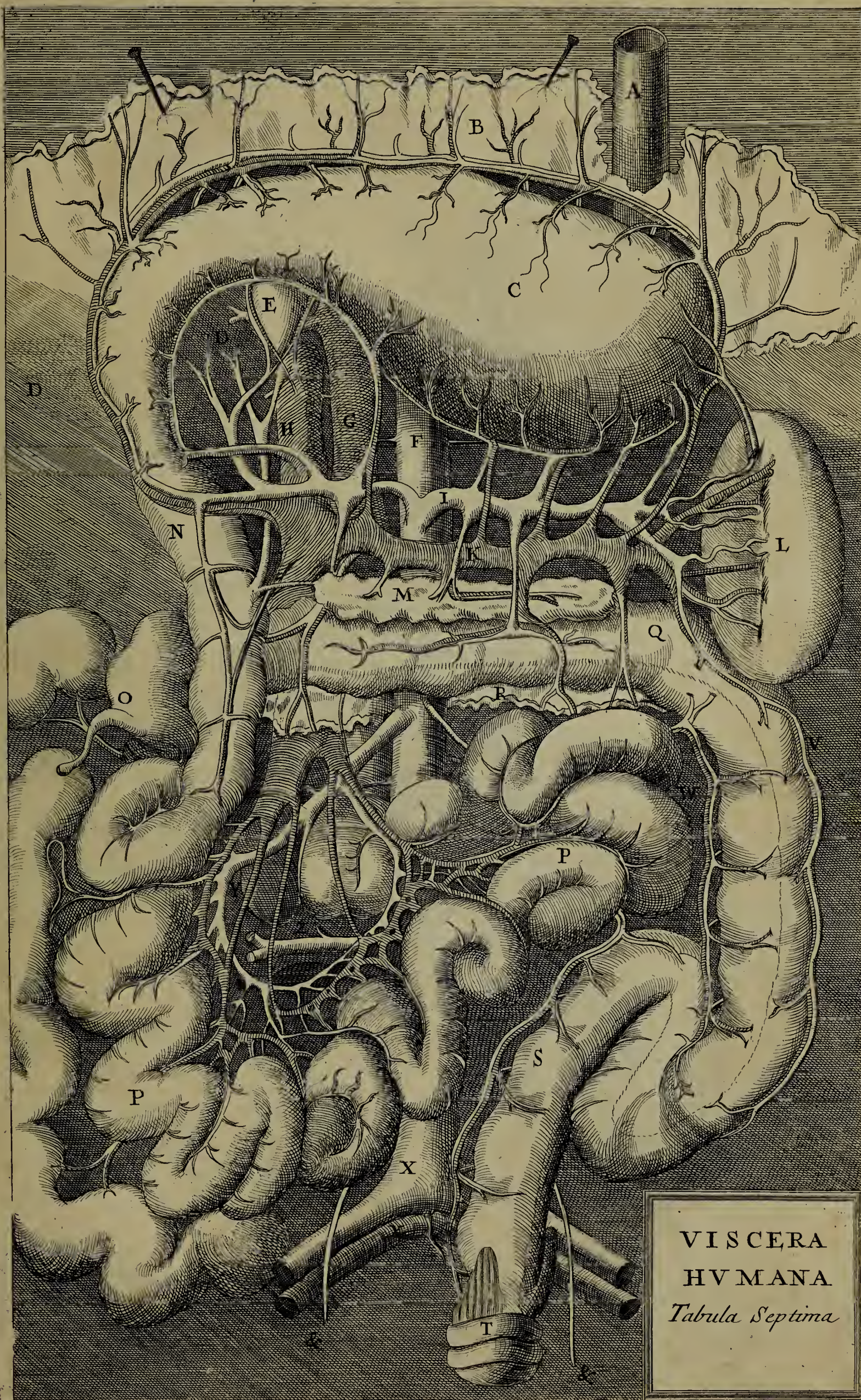


Humana DICHOTOMIA Nervosi generis in sinistro latere distributionem. communis. Apr. 1722
Sagacissimo Tancredo Robinson M.D. vitalis aure canales D. W. Sukeley



Stukeley delin.

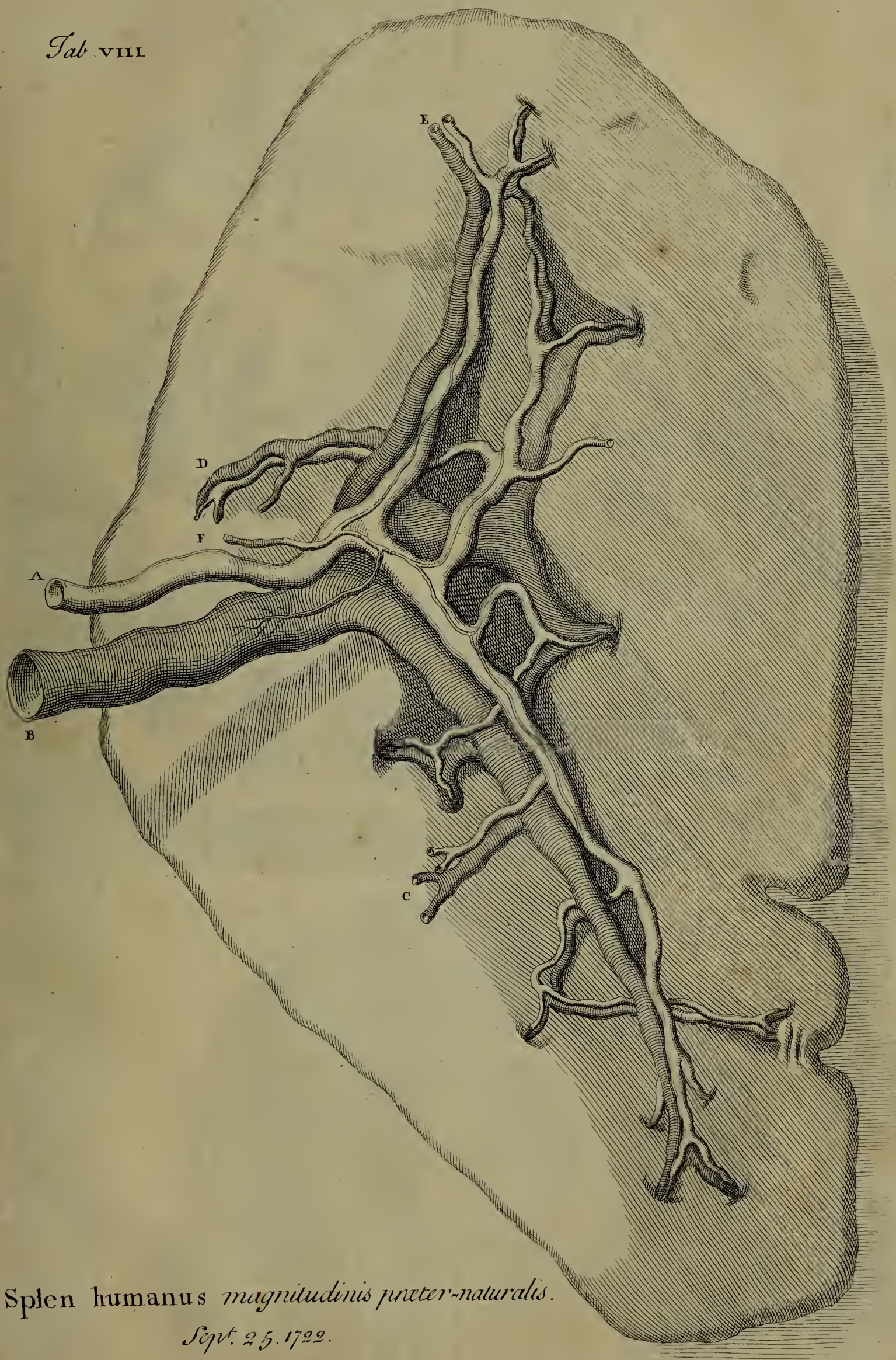




VISCERA
HVMANA
Tabula Septima



Tab. VIII.



Splen humanus magnitudinis preter-naturalis.

Sept. 25. 1722.

These plates are to be bound after the Elephant

Sectio Cranii Elephantis

TAB. I.

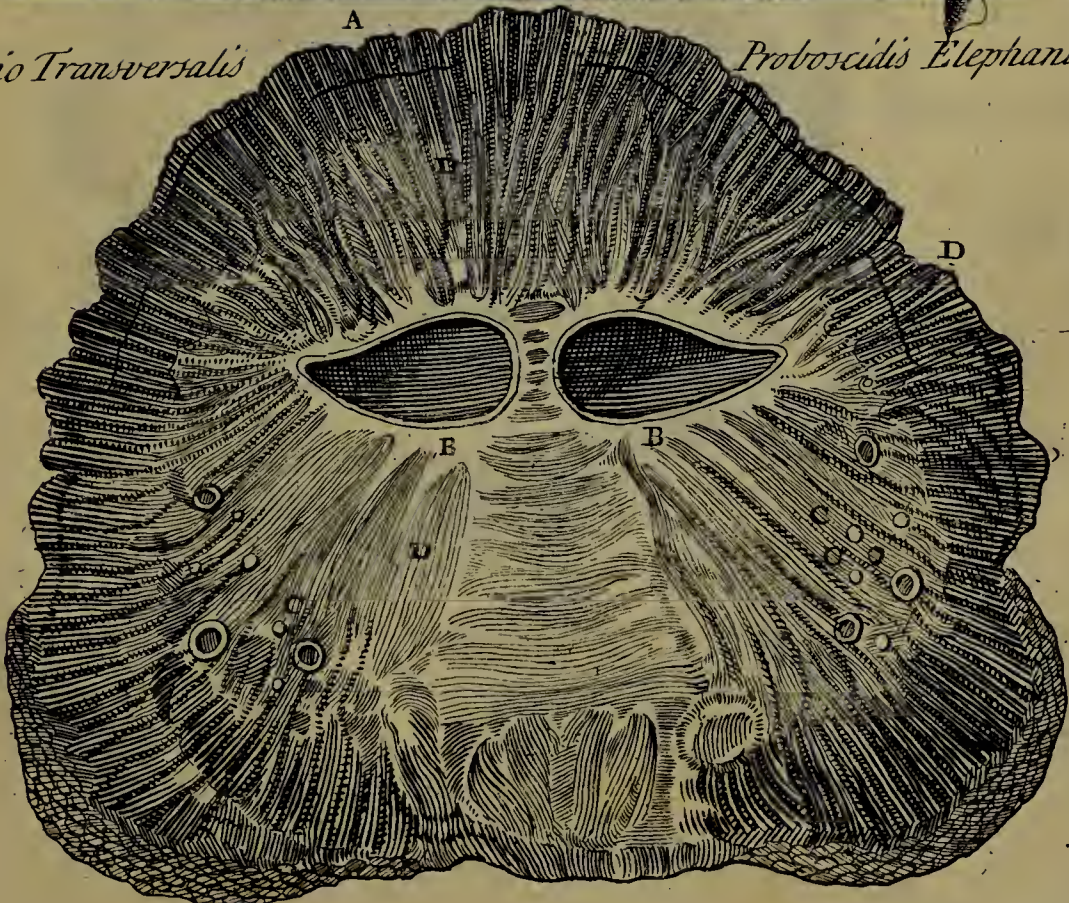
Fig. I.



Sectio Transversalis

Proboscidis Elephantis.

Fig. II.



*Egregio Viri & Naturæ Consultissimo Dno. Hans Sloan Barr. to M.D. C.M.L.
Præsidi & S.R.L. Propresidi Tabellam merito Votivam D.W. Stukeley M.D.*

Stukeley delin.

Thornton Sculp.

PLATE I. THE GREAT BRITISH MUSEUM.

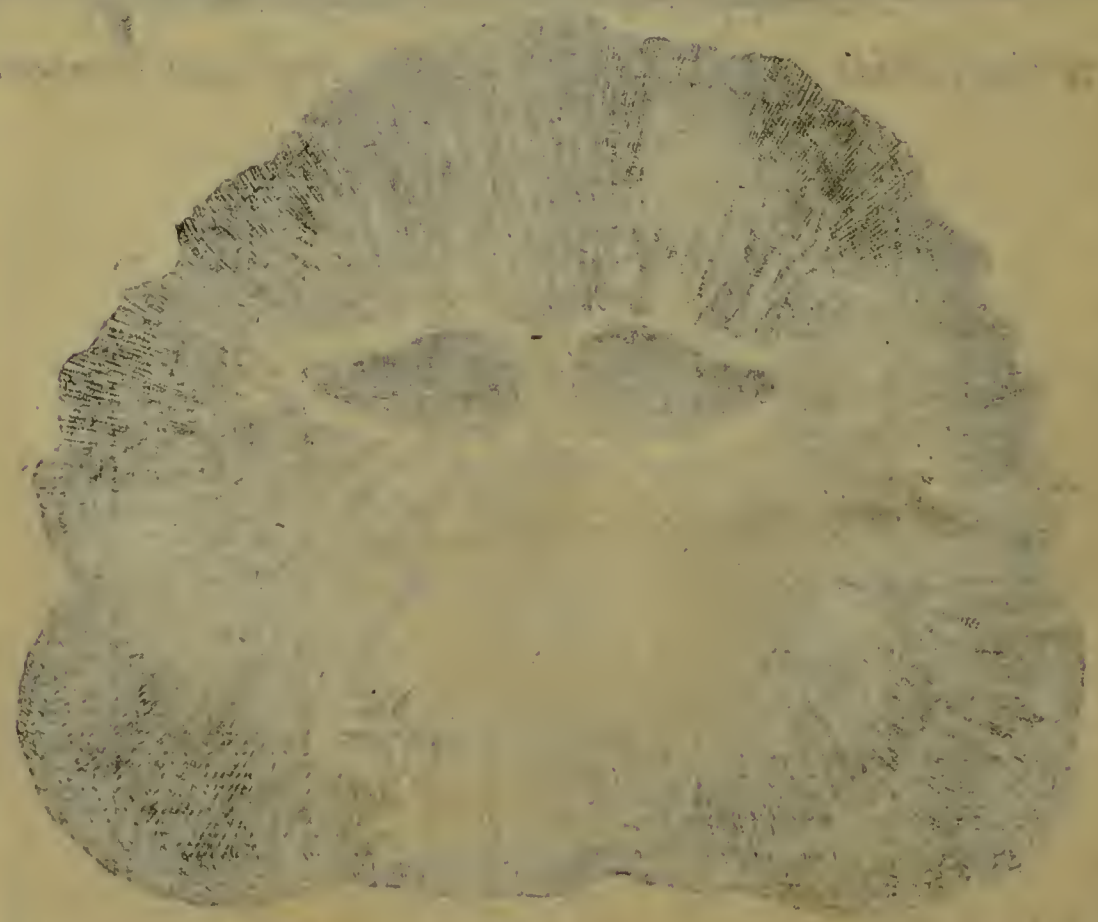
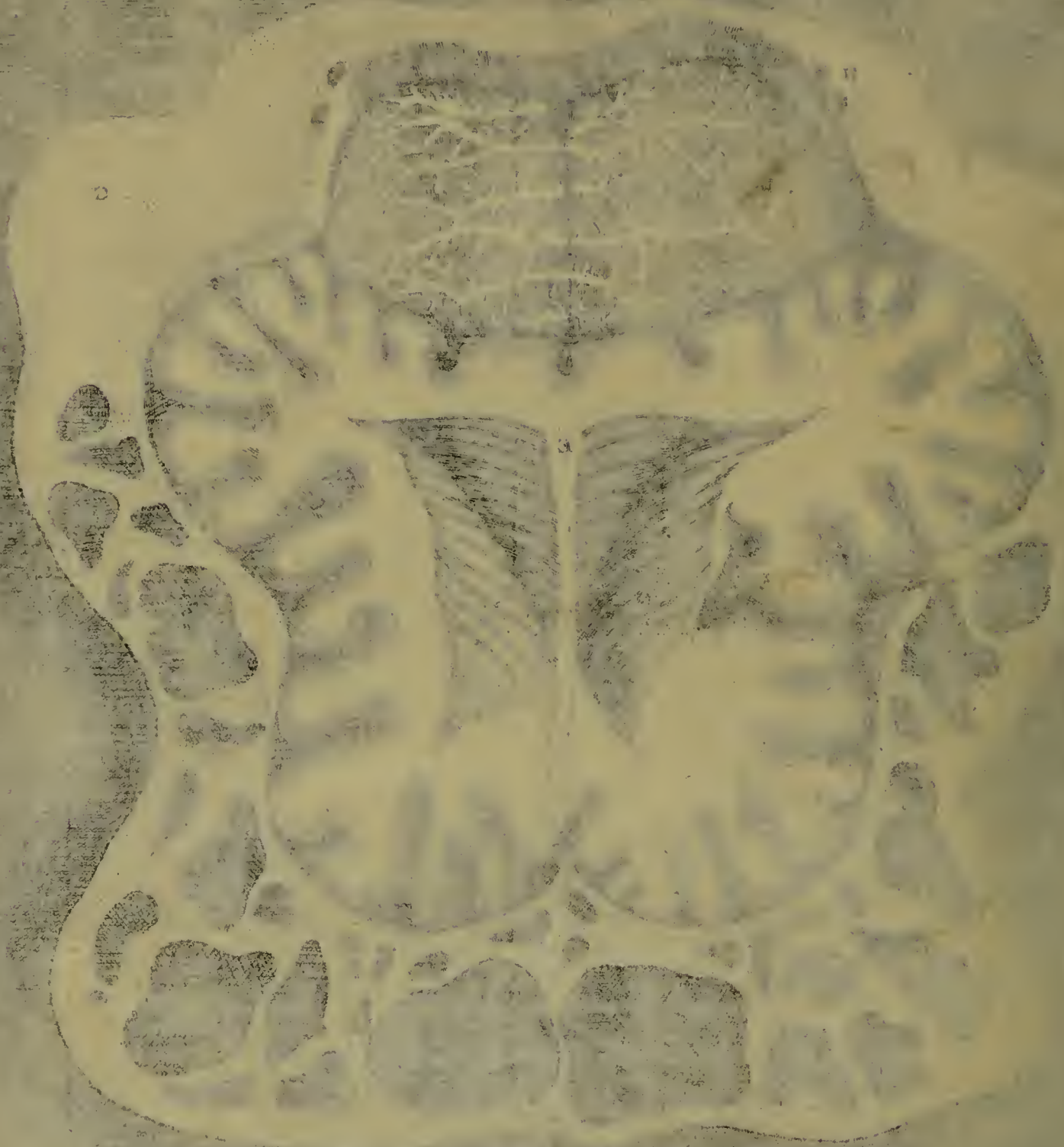
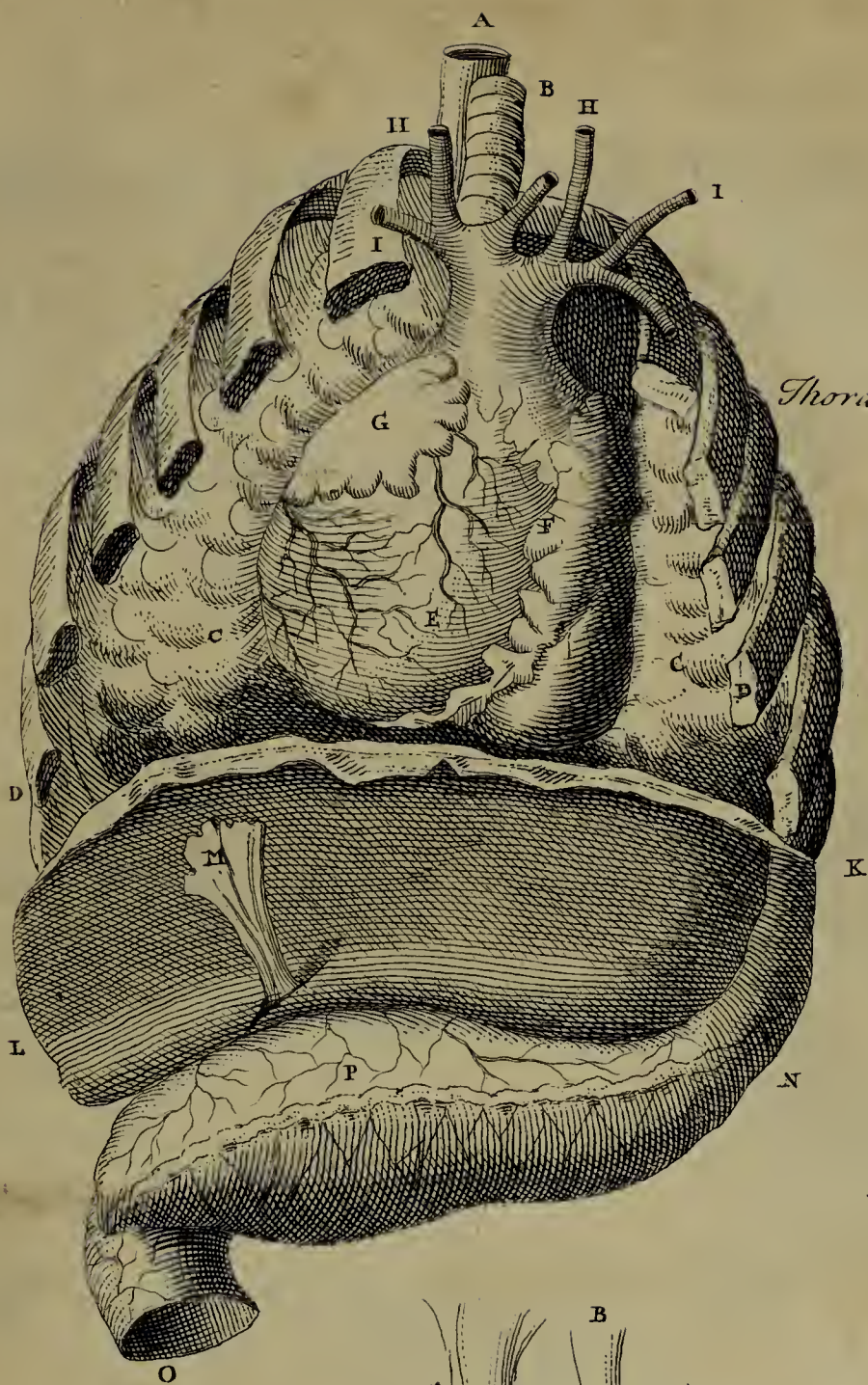


PLATE II. THE GREAT BRITISH MUSEUM.

TAB II.

Fig. I.



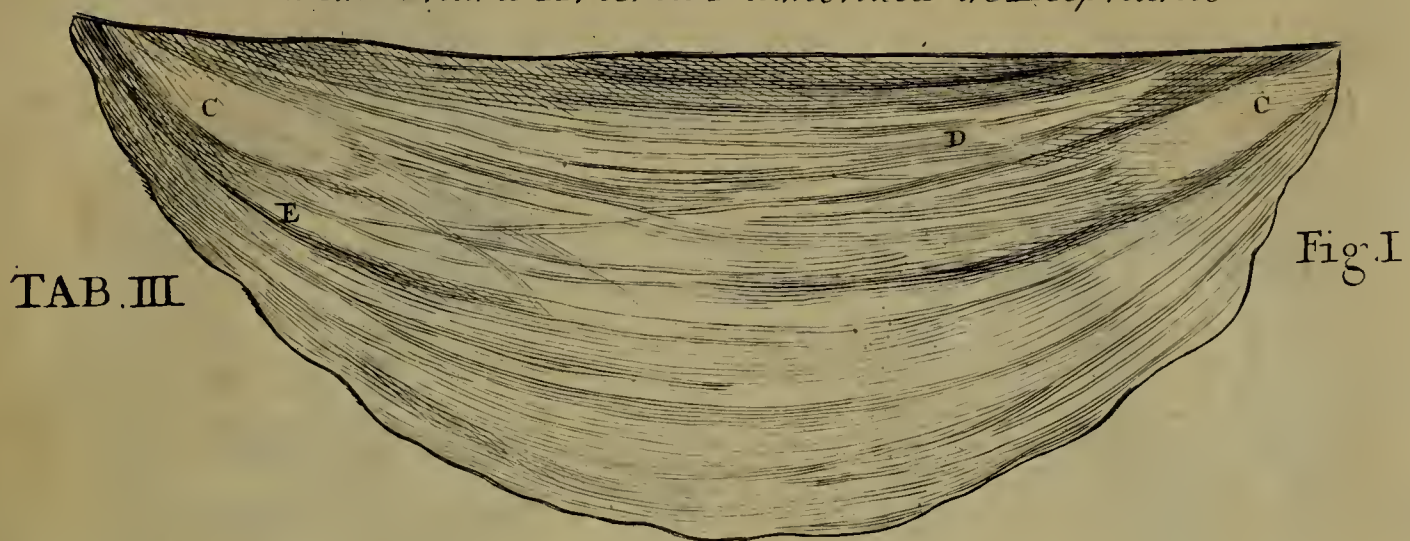
Thorax Elephanti apertus



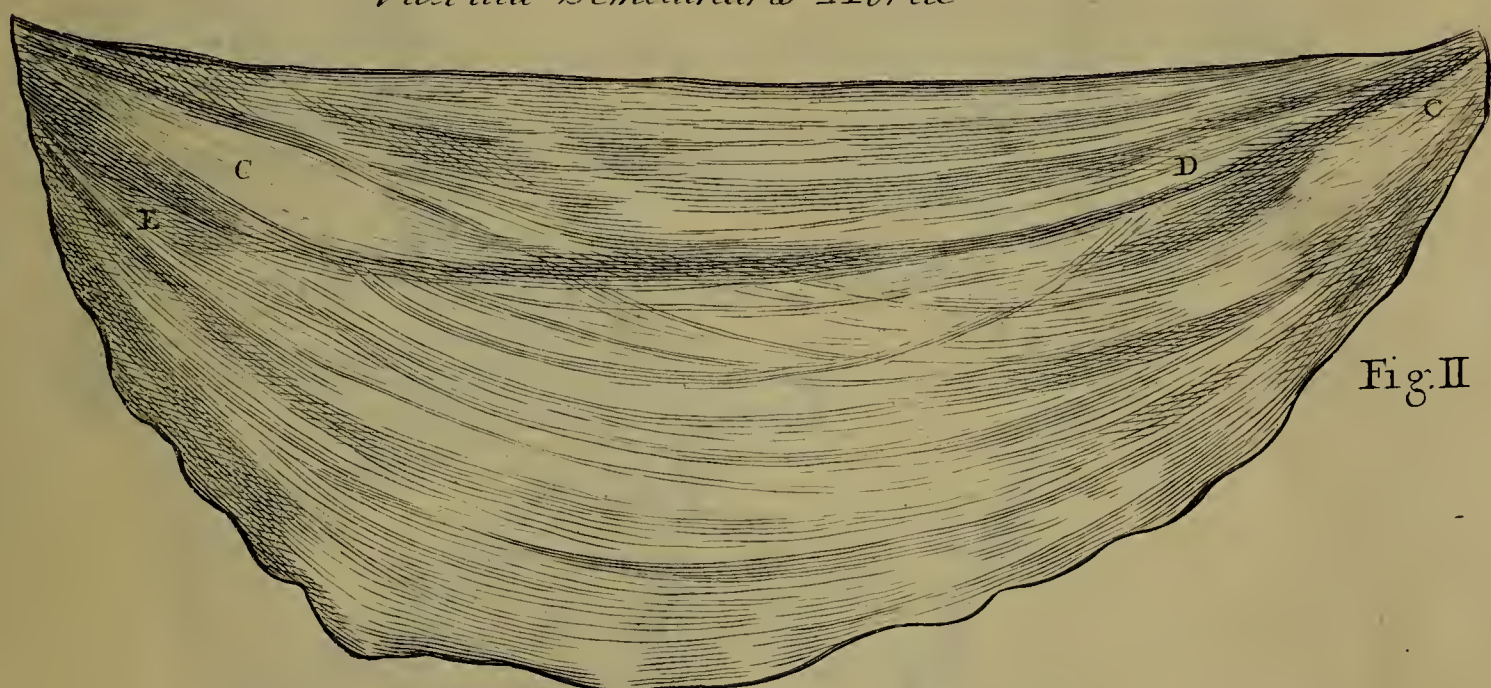
Abdomen apertum

Fig. II.

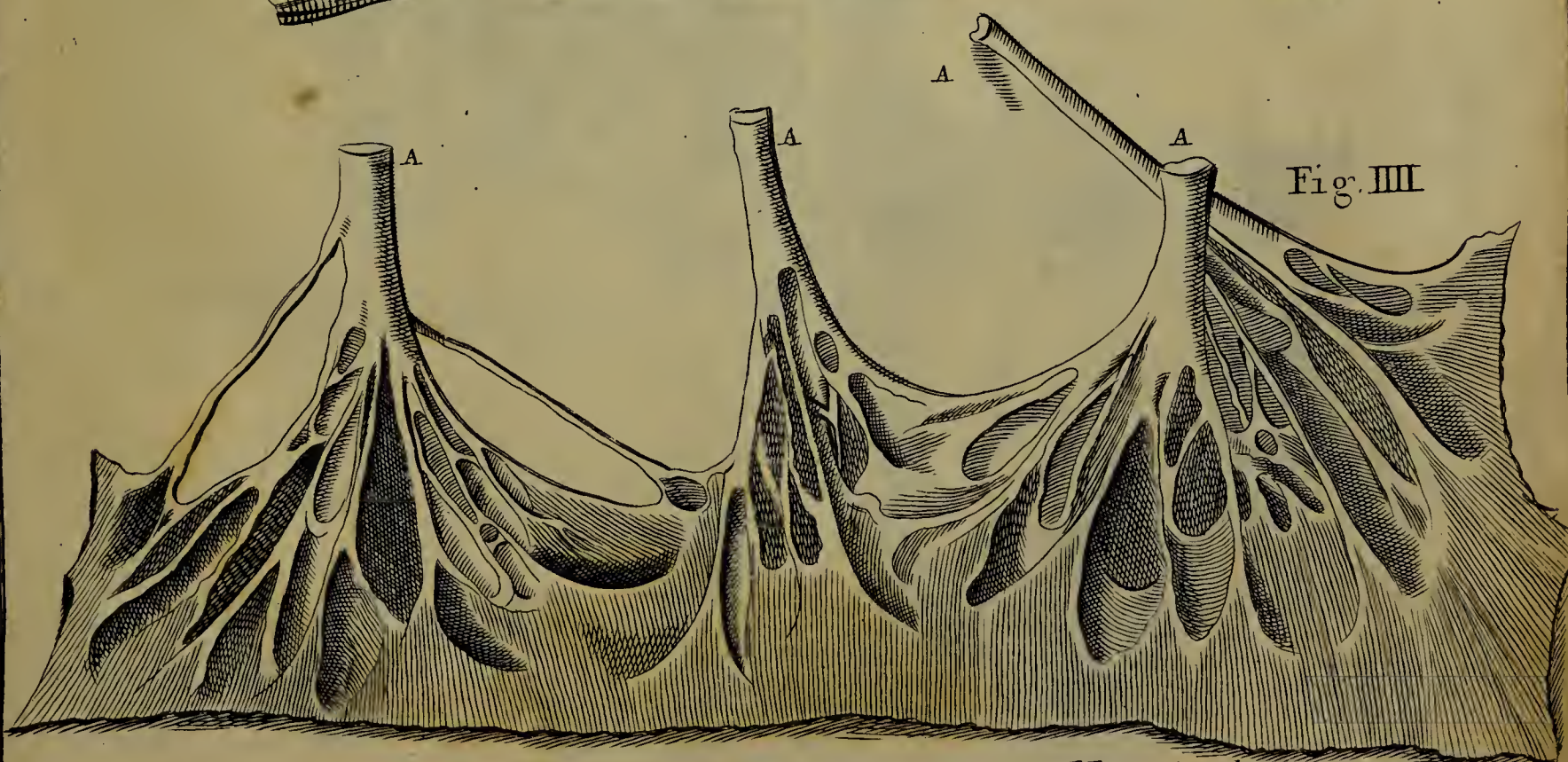
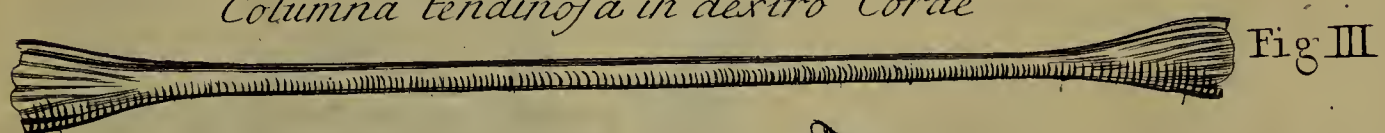
Valvula Semilunaris Arteriae Pulmonalis in Elephanto



Valvula Semilunaris Aortae



Columna tendinosa in dextro Corde



Valvulae Tricuspidales dextri Cordis Ventriculi

TAB. III.

Pars Omenti Elephantini

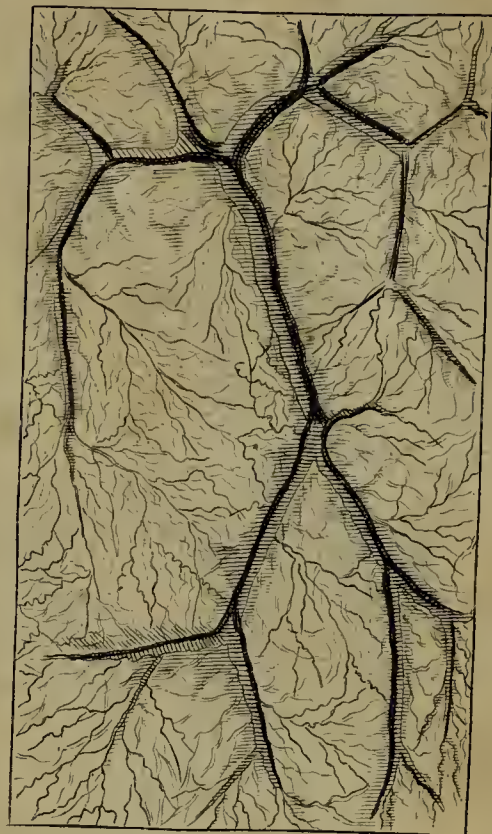


Fig. I.

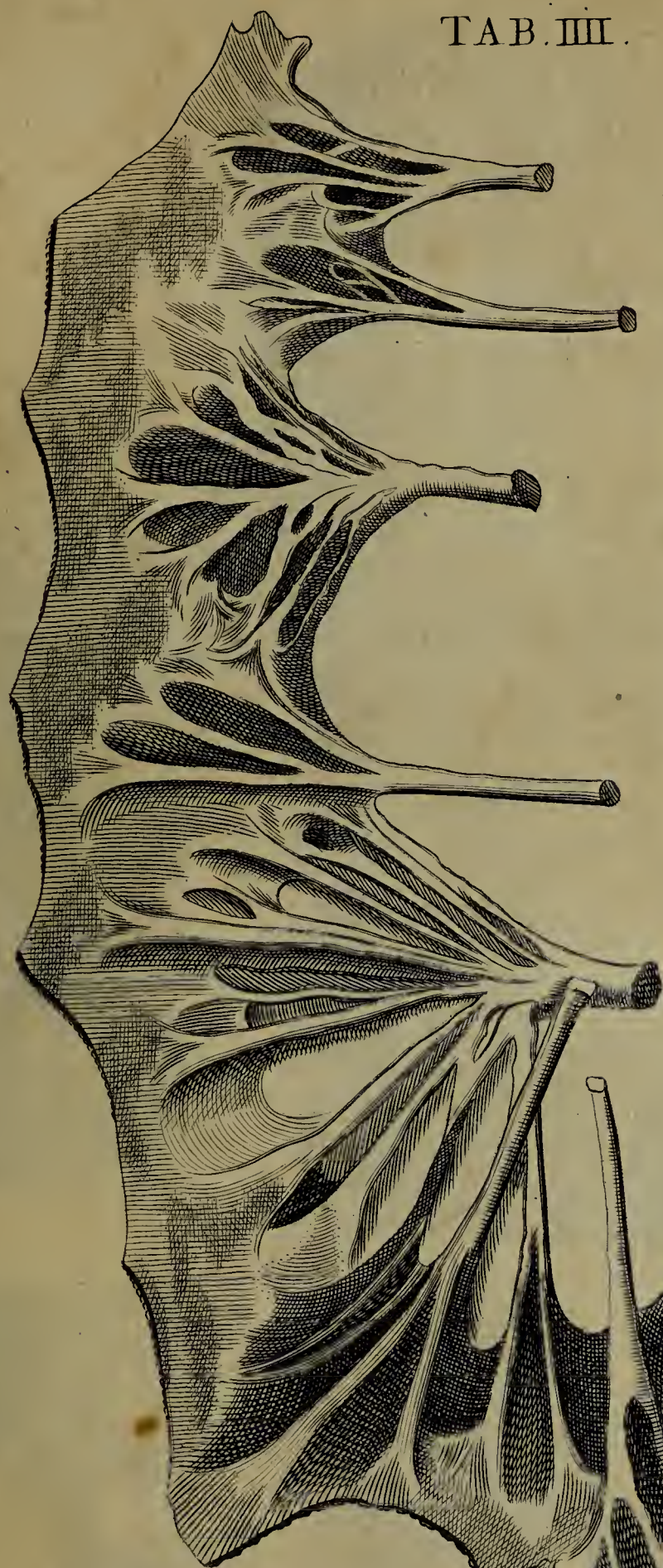


Fig. II.

A O

A O

*Valvula Tricuspidales
sinistri Cordis Ventri-
culi in Elephanto*

C

C

B

B

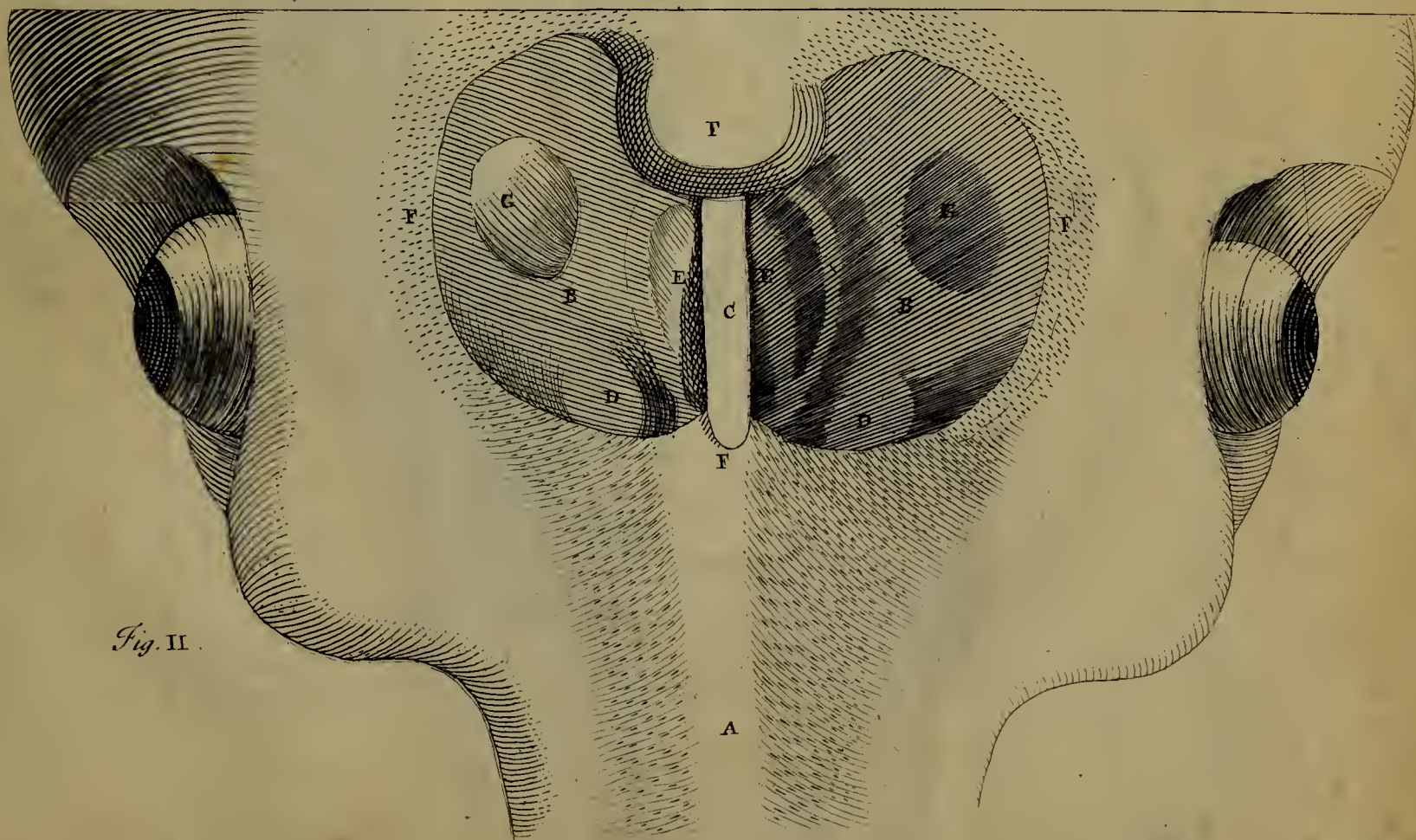
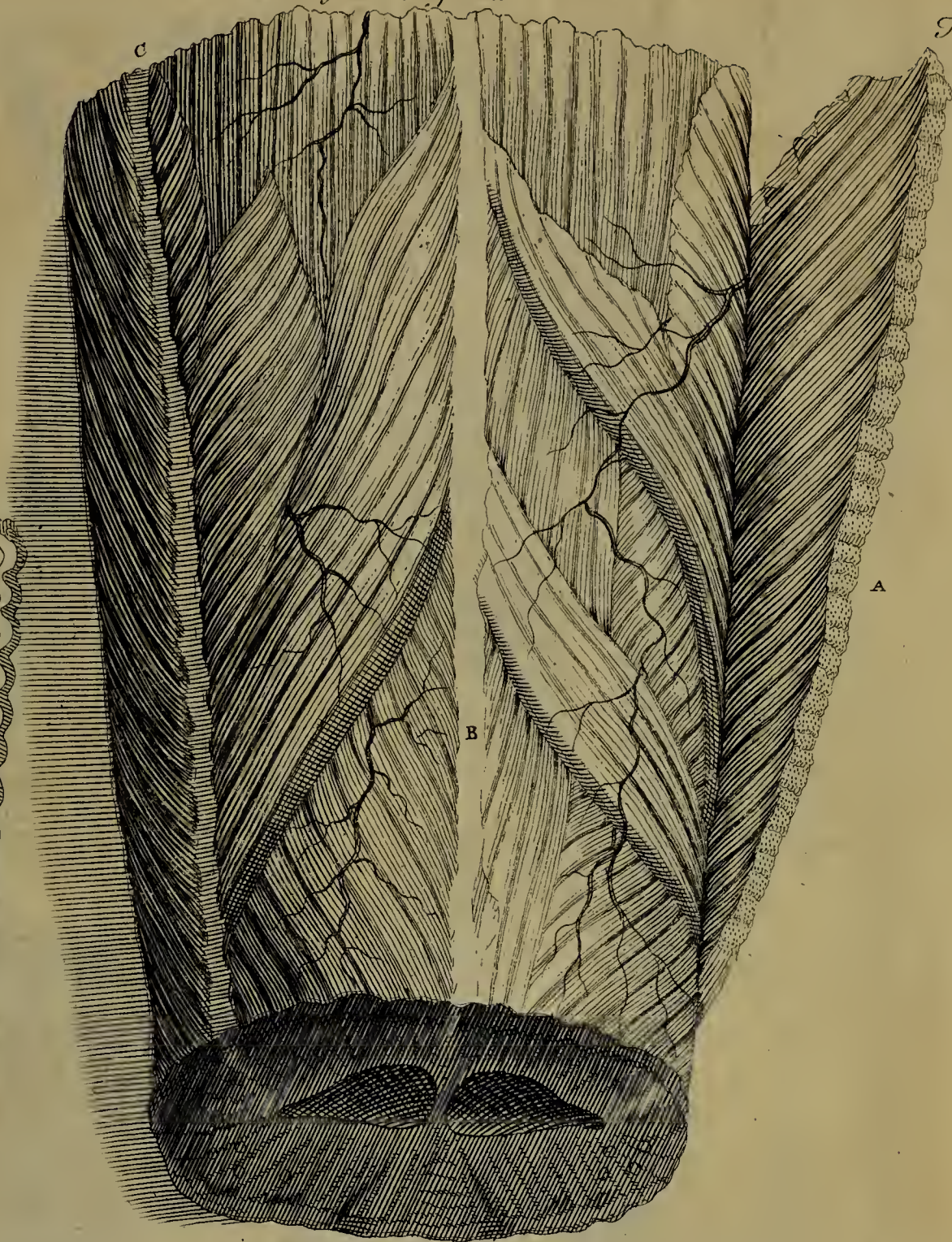
Pars Proboscidis Elephanti.

Fig. I.

*Musculus Proboscidis
Longitudinalis.*

Longitudinalis.

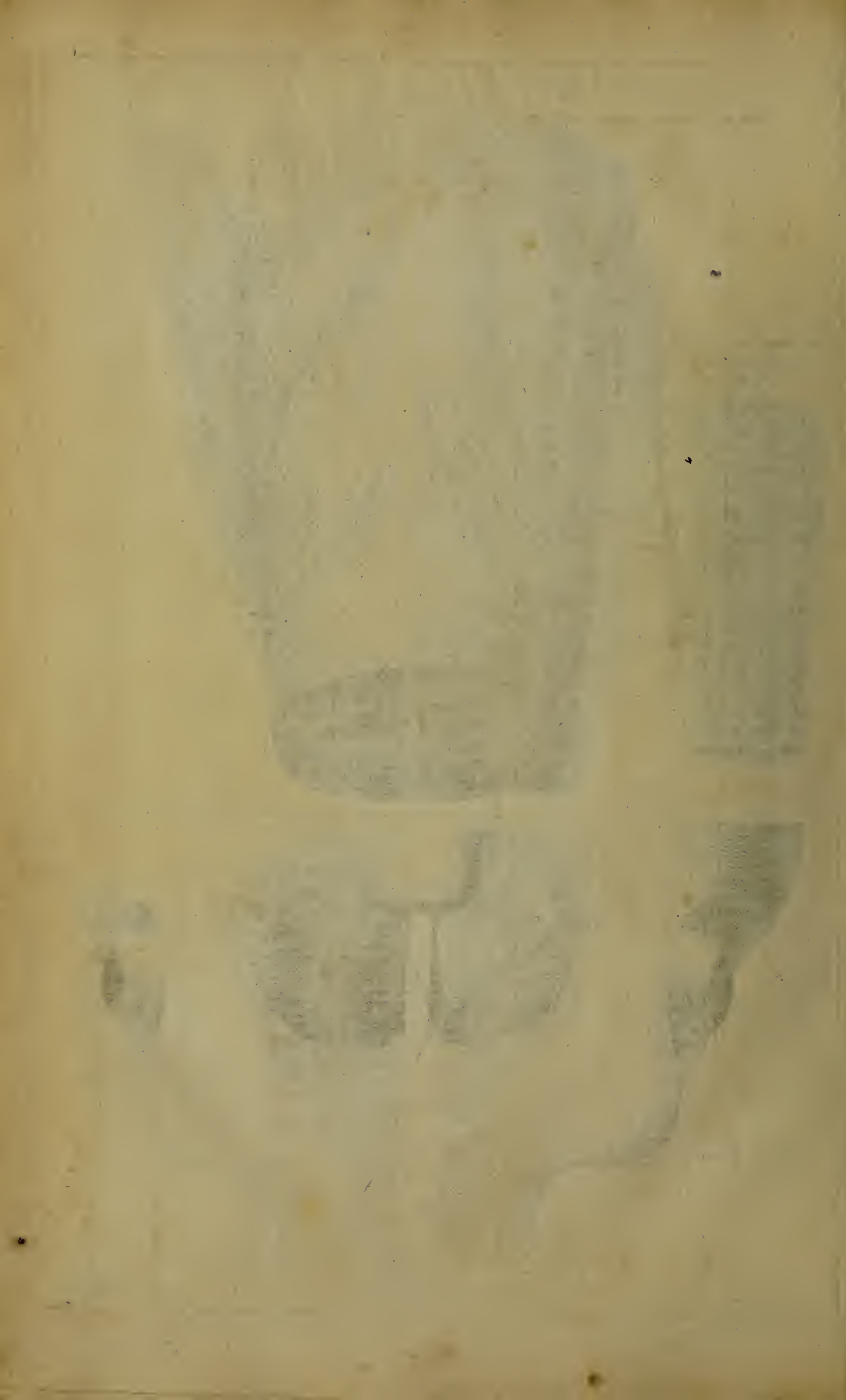
Fig. III.

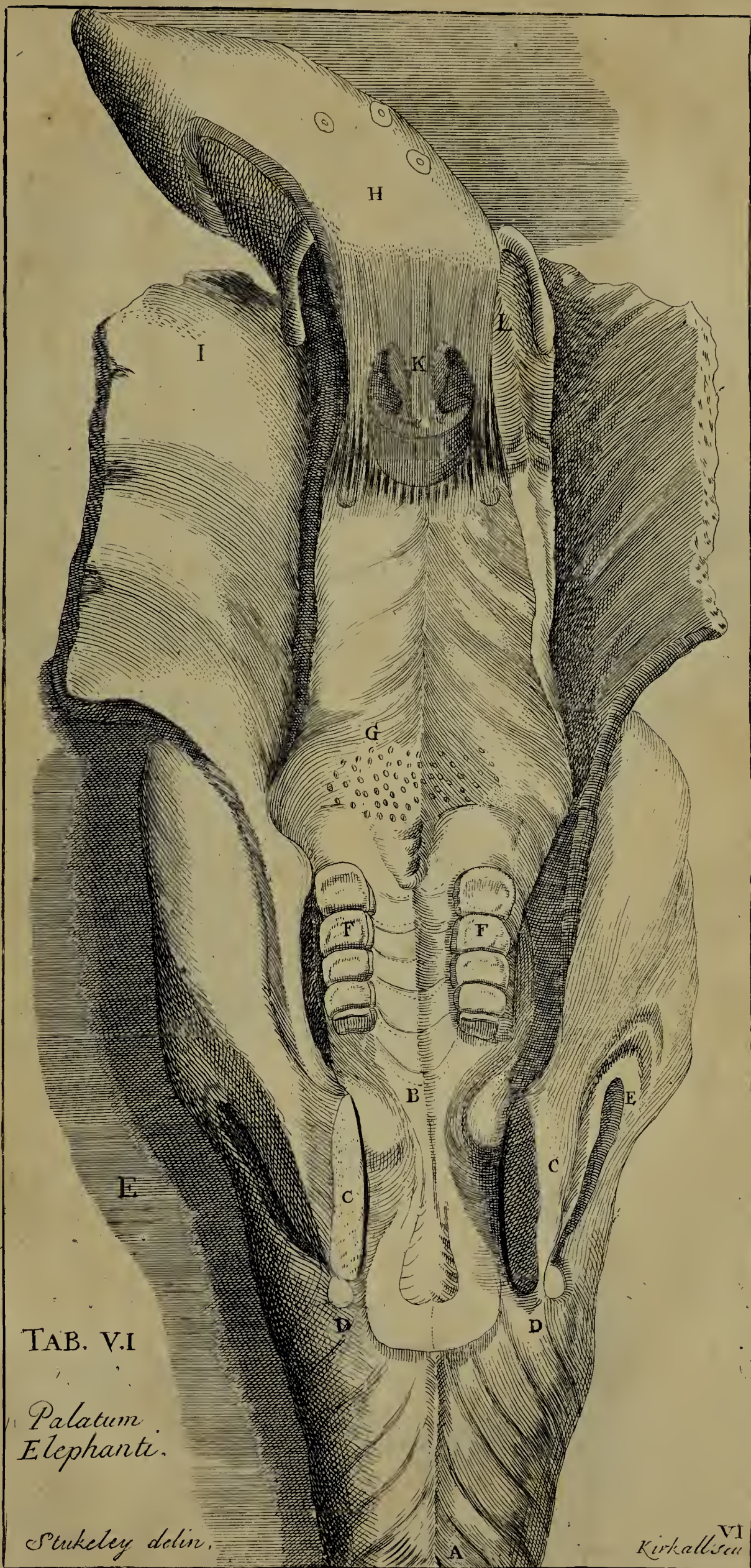


Os Frontis

1^{te} Gucht Sculpt.

Strikelenj delin.



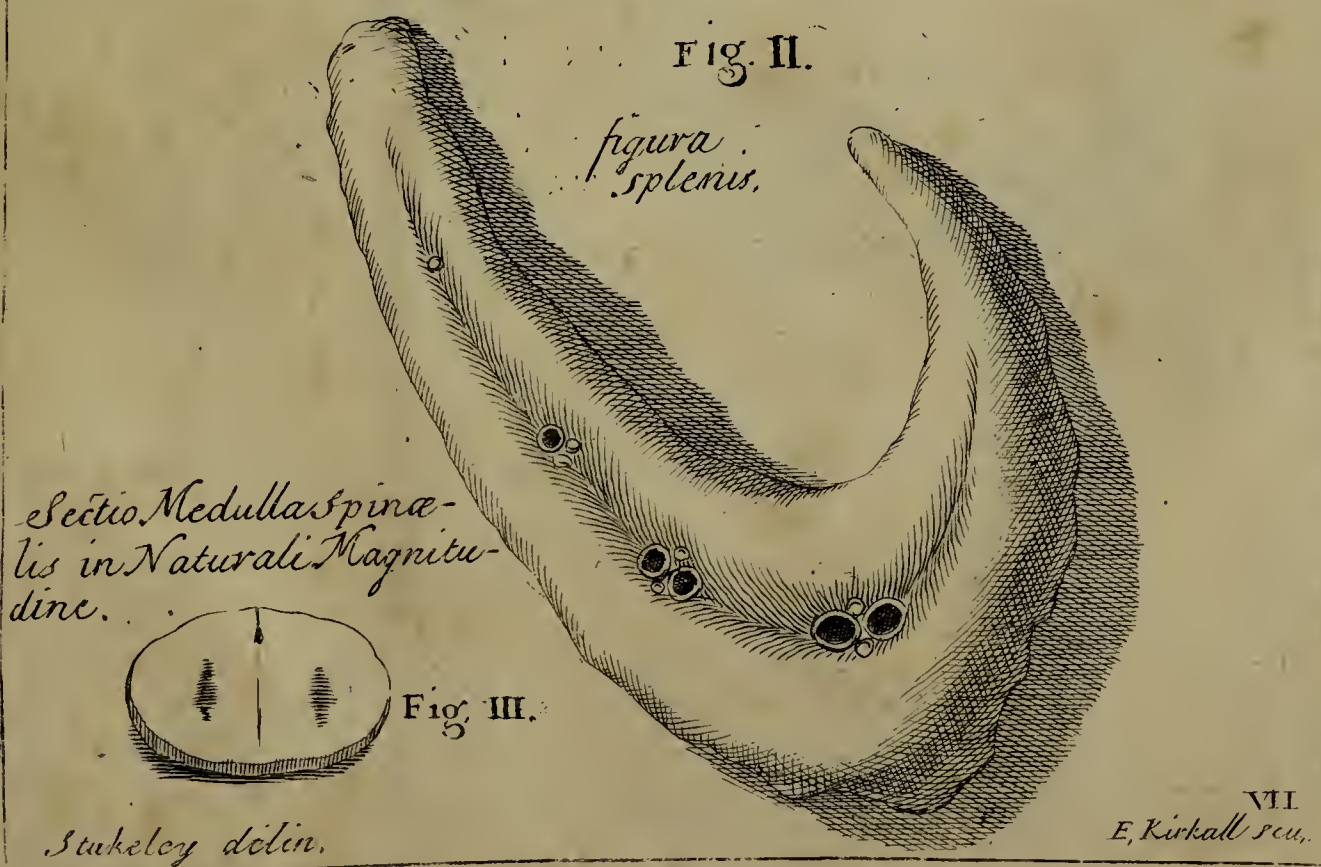
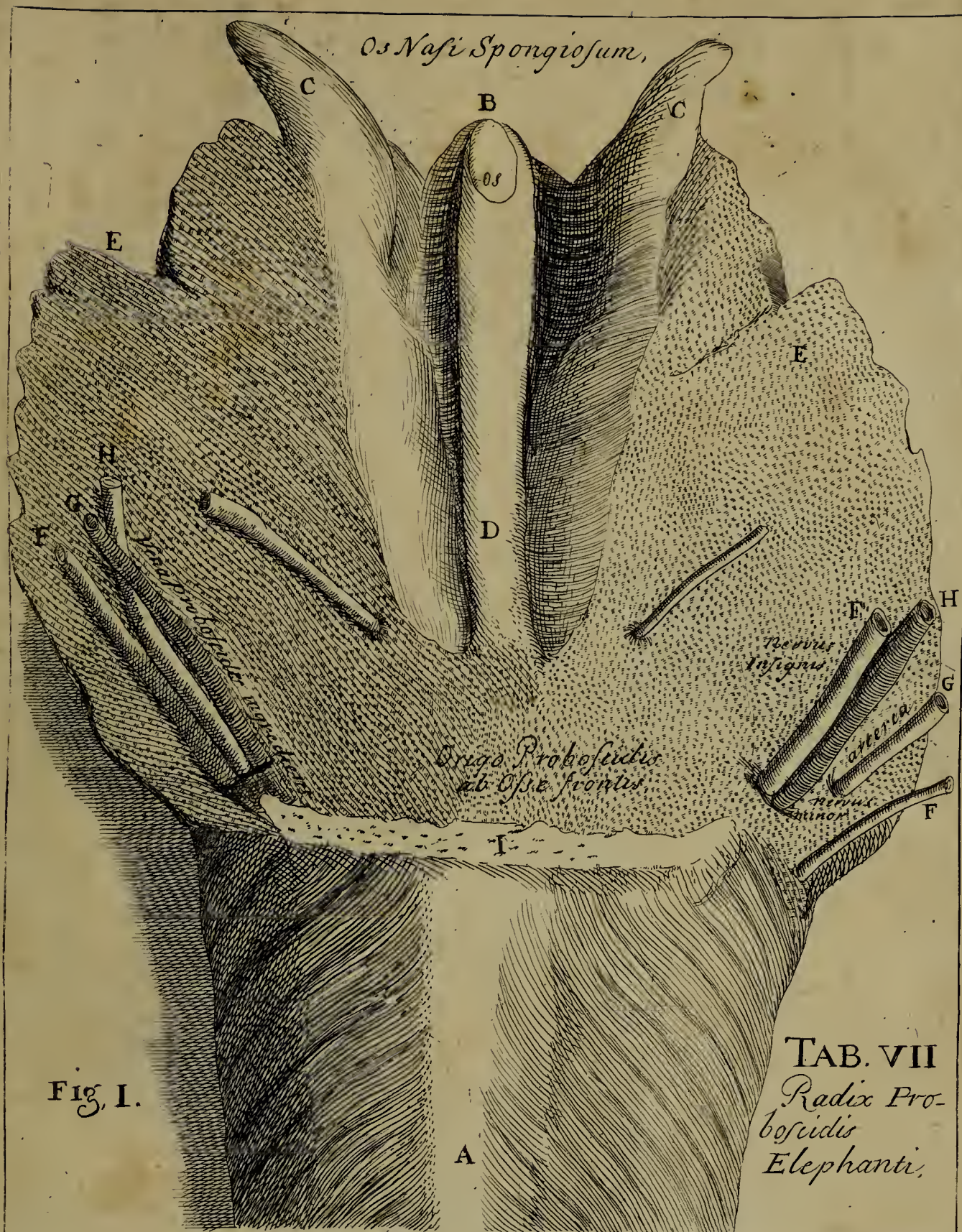


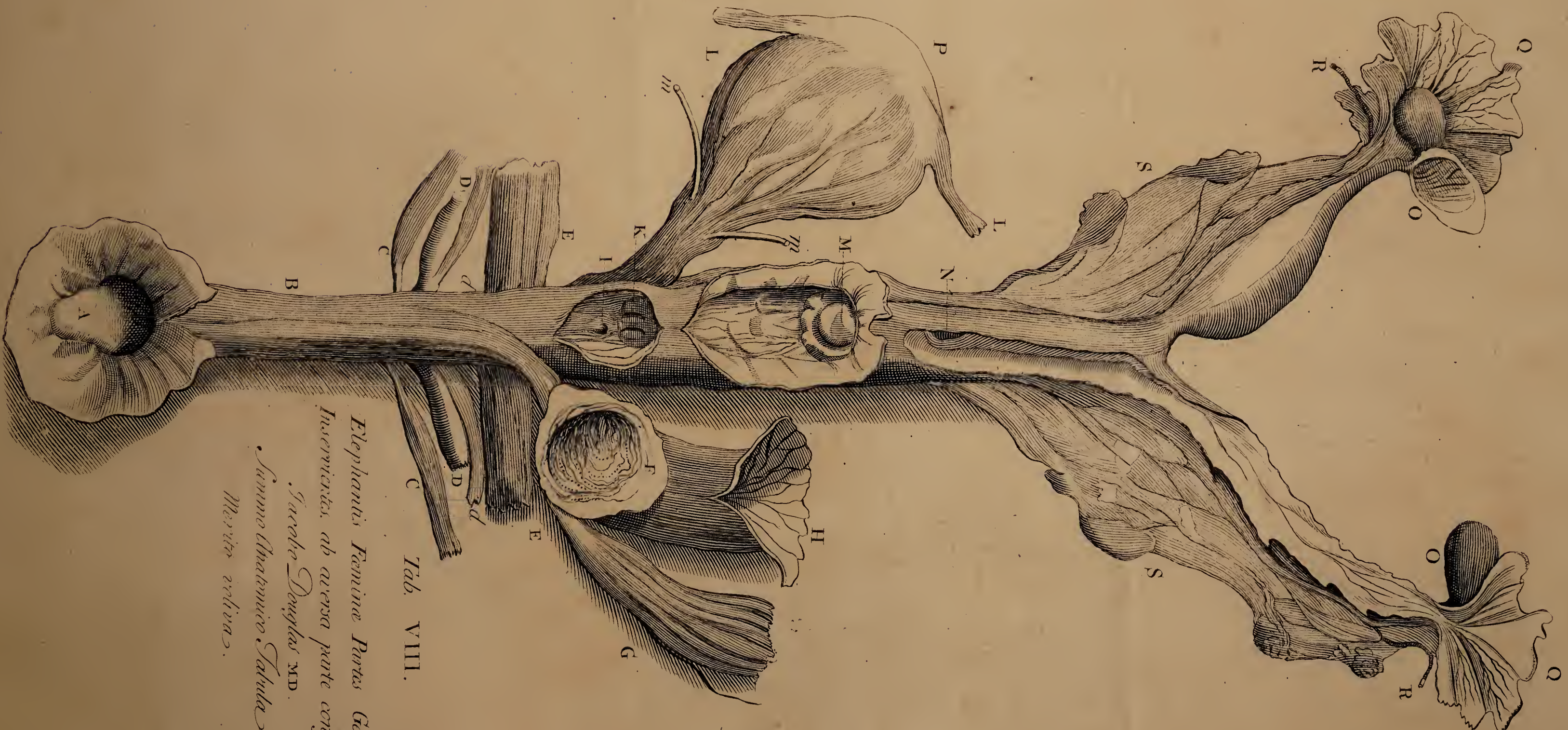
TAB. V.I

*Palatum
Elephanti.*

Stukeley delin.

Kirkall scul VI





Tab. VIII.

*Elephantis Femine Partes Generationi
Inseruita, ab aversa parte conspiciuntur.
Jacobo Douglas MD.
Summo Chirurgo Statula
Mortis vivas.*

20 H. 9992

Manuel C. Causten.
Washington Dec.
Dec 1858.

